

FCC ID: T62TAL4BTN

IC ID: 4397A-T62TAL4BTN

Model: 2994043

Manufacturer: Johnson Outdoors, Inc.

Description: Anchor Remote Control Transmitter

Certification Test Report

2010-09-24

Contents

1. Introduction	3
2. Statement of Compliance	3
2.1. FCC Part 2 §2.907	3
2.2. FCC Part 2 §2.911	3
2.3. FCC Part 2 §2.913	3
2.4. FCC Part 2 §2.915	3
2.5. FCC Part 2 §2.925	4
2.6. FCC Part 2 §2.943, 2.945	4
2.7. FCC Part 2 §2.947	4
2.8. FCC Part 2 §2.948	4
2.9. FCC Part 2 §2.1033	5
3. Discussion of Laboratory Measurements and Rules Compliance	6
3.1. FCC Part 15 §15.231(a)(1)	6
3.2. FCC Part 15 §15.231(a)(2)	6
3.3. FCC Part 15 §15.231(a)(3)	6
3.4. FCC Part 15 §15.231(a)(4)	6
3.5. FCC Part 15 §15.231(a)(5)	6
3.6. FCC Part 15 §15.231(b)	6
3.6.1. Raw Field Strength Limits.....	6
3.6.2. Duty Cycle Correction Factor and Resulting Limits	7
3.6.3. Measured Radiated Field Strength Data	7
3.7. FCC Part 15 §15.231(c).....	7

1. Introduction

Model 2994043 is a small, handheld, battery-powered transmitter used for controlling marine electronics. Certification is requested under FCC Rules, Part 15, Subpart C, Paragraph 15.231.

2. Statement of Compliance

Specific sections of FCC Rules Part 2 that require information or listing are given below.

2.1. FCC Part 2 §2.907

This is an application for certification of original equipment

2.2. FCC Part 2 §2.911

- a) This application has been filed electronically using form 731.
- b) All required information has been supplied in this application and its attachments.
- c) This applicant has signed the application electronically.
- d) The technical test data has been signed by the agency performing the testing.
- e) Signature supplied in appropriate block on form 731.
- f) Processing fee has been paid by credit card.
- g) Signatures have been supplied electronically.

2.3. FCC Part 2 §2.913

- a) This application has been filed electronically.
- b) Appropriate fees have been filed electronically.
- c) Equipment samples shall be supplied as requested.

2.4. FCC Part 2 §2.915

We are requesting a grant of certification. This application shows compliance with the technical standards.

2.5. FCC Part 2 §2.925

The equipment enclosure is embossed with the FCC identifier “FCC ID: T62TAL4BTN”. See exhibit “Label.pdf” for photographs showing the labeling and location. External and internal photos are provided in exhibits “External Photo.pdf” and “Internal Photo.pdf”.

2.6. FCC Part 2 §2.943, 2.945

Sample production equipment shall be submitted to the FCC upon request.

2.7. FCC Part 2 §2.947

- a) Measurement procedure follows ANSI C63.4 version 2009.
- b) A description of utilized test equipment is contained in attached “Radiated Data.pdf”.

2.8. FCC Part 2 §2.948

Radiated measurements were taken at the following FCC-approved facility:

Compliance Certification Services
47173 Benicia Street, Fremont, CA 94538, USA
Tel: 1-510-771-1000

Fax: 1-510-661-0888

Contact: Thu Chan

tchan@ccsemc.com,

See exhibit "Test Setup Photo.pdf" for a photo of the test site.

2.9. FCC Part 2 §2.1033

- a. Form 731 has been filed electronically.
- b. The technical report, along with its exhibits, contains the information as follows:
 - 1. Full name and mailing address of the manufacturer of the device and the applicant for certification:
Johnson Outdoors, Inc., 555 Main Street, Racine, WI 53403, USA
 - 2. FCC Identifier is **T62TAL4BTN**
 - 3. Copy of the installation/user instructions is furnished in exhibit "Product Manual.pdf"
 - 4. A brief description of the device and operation is furnished in exhibit "Operational Description.pdf".
 - 5. Block diagram is furnished in exhibit "Block Diagram.pdf". Schematic is furnished in exhibit "Schematic.pdf".
 - 6. This document constitutes a technical test report.
 - 7. Internal photographs are furnished in exhibit "Internal Photo.pdf". External photographs are furnished in exhibit "External Photo.pdf".
 - 8. Not applicable. There are no peripheral or accessory devices used with this device. It is a standalone device.
 - 9. This application not pursuant to the transition rules of section 15.37
 - 10. Not applicable. This device does not include a scanning receiver.
 - 11. Not applicable
 - 12. Not applicable
- c. Not applicable. This device shall operate under Part 15 of the rules.
- d. Not applicable.
- e. Not applicable. This is not a composite system.

3. Discussion of Laboratory Measurements and Rules Compliance

All measurement procedures follow ANSI C63.4 version 2009

Conducted Measurements:

Conducted measurements were made using an Hewlett Packard Model 8591E spectrum analyzer with calibration due date 12/2/2010.

Emissions Measurements:

Radiated emission measurement equipment is detailed in attached "Radiated Data.pdf".

The DUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to DUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The frequency range of interest is monitored at a fixed antenna height and DUT azimuth. The following approaches are used to maximize the emissions:

- The DUT is rotated through 360 degrees
- The DUT is measured in three orthogonal orientations (X, Y, Z)
- The test equipment receive antenna height is adjusted from 1 to 4 meters above the ground plane
- The DUT is scanned with the test equipment receive antenna in Horizontal and Vertical orientations

Note regarding "pulses" in plots:

"Pulses" may be observed in some spectrum analyzer sweeps merely due to the FSK and the energy of the transmission moving in and out of the RBW filter. It is true FSK so the transmitter is ALWAYS ON during the packet, but toggles between low and high frequencies as the bits change. In the "operational description" the terms "low" and "high" refer to low and high frequency.

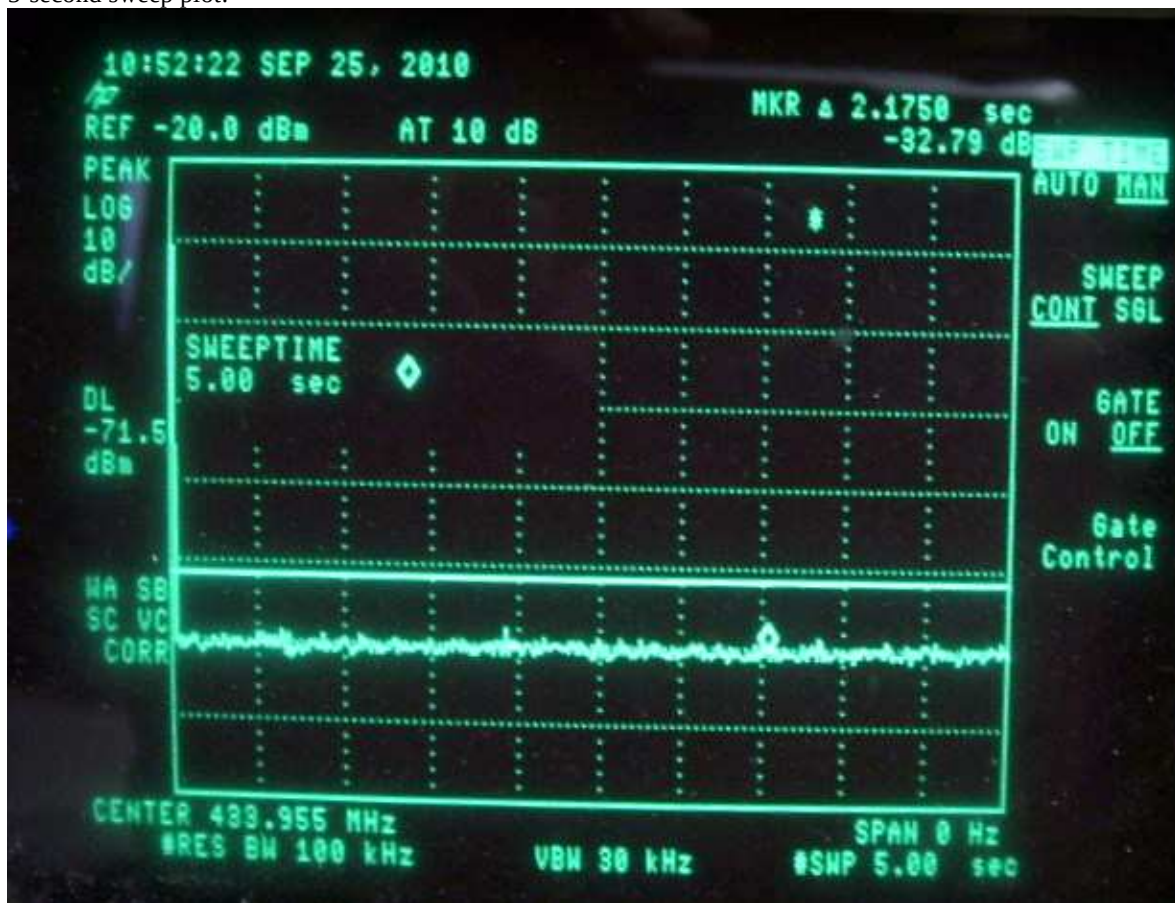
3.1. FCC Part 15 §15.231(a)(1)

A microcontroller monitors the inputs for activations and transmits a single 17.4ms data packets when valid a activation is detected.

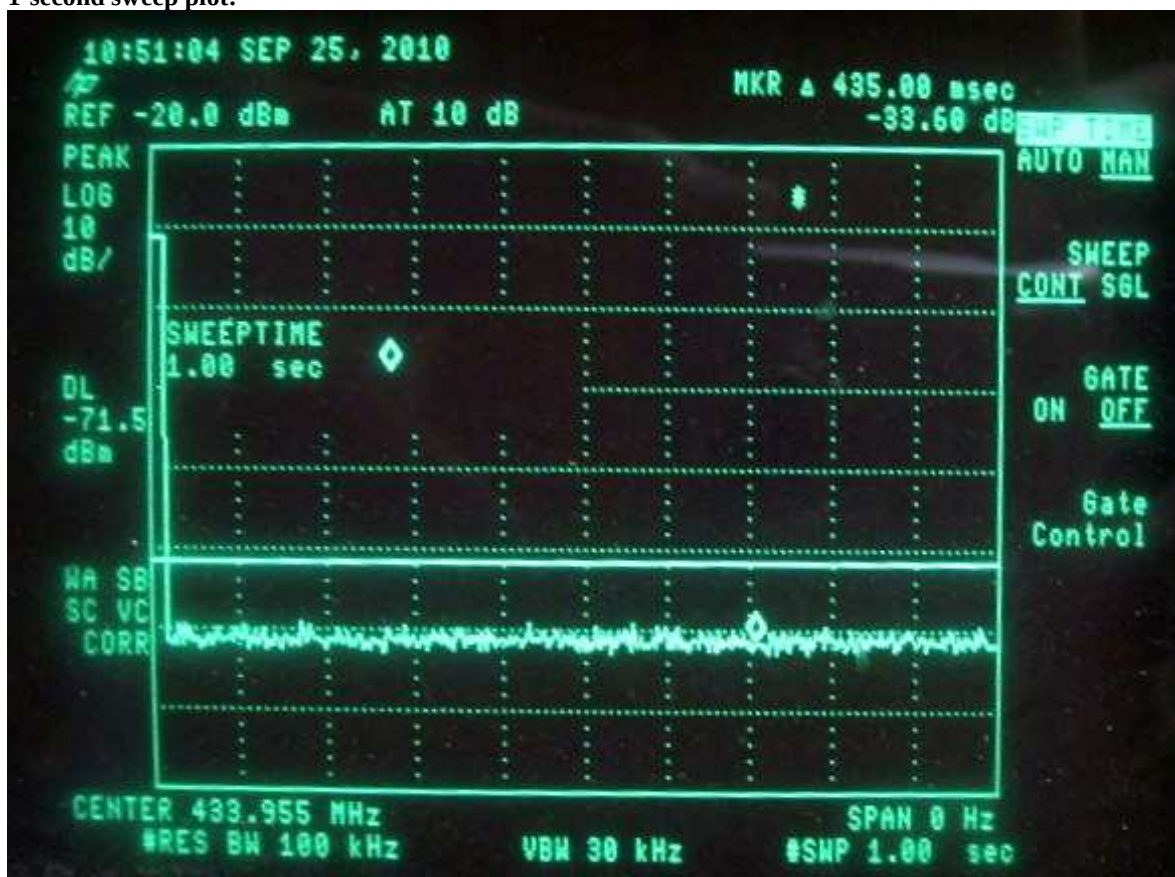
3.2. FCC Part 15 §15.231(a)(2)

A plot of the transmissions is shown below. The transmitter sends a single packet when a button is pressed and held. The transmission is not repeated until the user releases the button and presses it again. Therefore, plots below showing a single packet represent the entire packet train that is transmitted upon button press. The following plots show the transmission ceasing in less than 5 seconds. (Plots with sweeps shorter than 5 seconds are shown because it is difficult to see the short packet on the 5-second plot.)

5-second sweep plot:



1-second sweep plot:



3.3. FCC Part 15 §15.231(a)(3)

The device does not send supervisory packets.

3.4. FCC Part 15 §15.231(a)(4)

Does not apply. Device sends one packet per activation.

3.5. FCC Part 15 §15.231(a)(5)

Device does not send setup information.

3.6. FCC Part 15 §15.231(b)

3.6.1. Raw Field Strength Limits

Interpolation performed on the data in the §15.231(b) table yields raw field strength limits as follows:

Fundamental: 80.8 dBuV/m

$(20 * \text{Log10}(3750 + (433.92-260) * (12500-3750)/(470-260)))$

Spurious: 60.8 dBuV/m

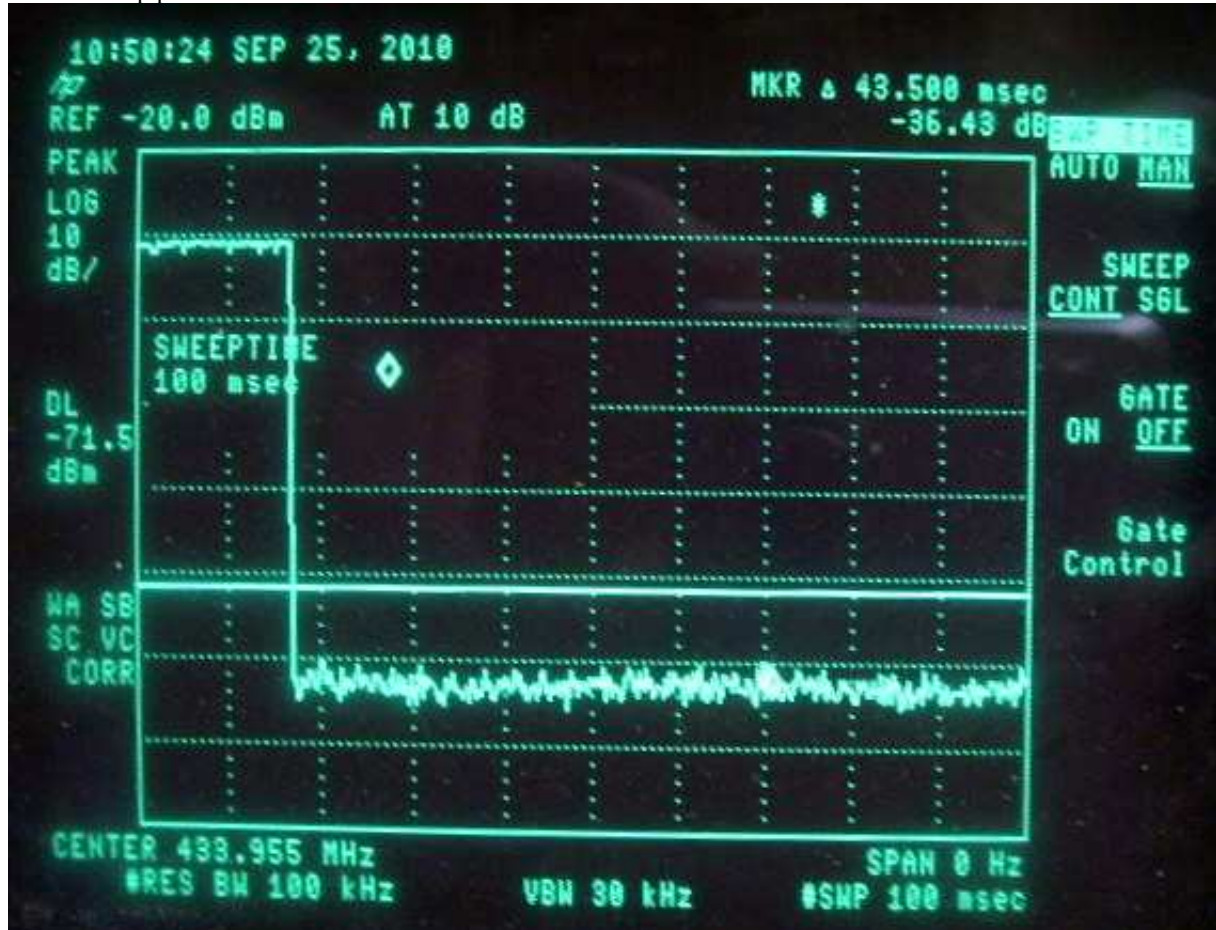
Certain harmonics of the transmitted signal fall in the restricted bands of §15.205. These harmonics are all above 960MHz and have the following limit as given in §15.209:

Restricted band limit = 500uV/m = 54dBuV/m.

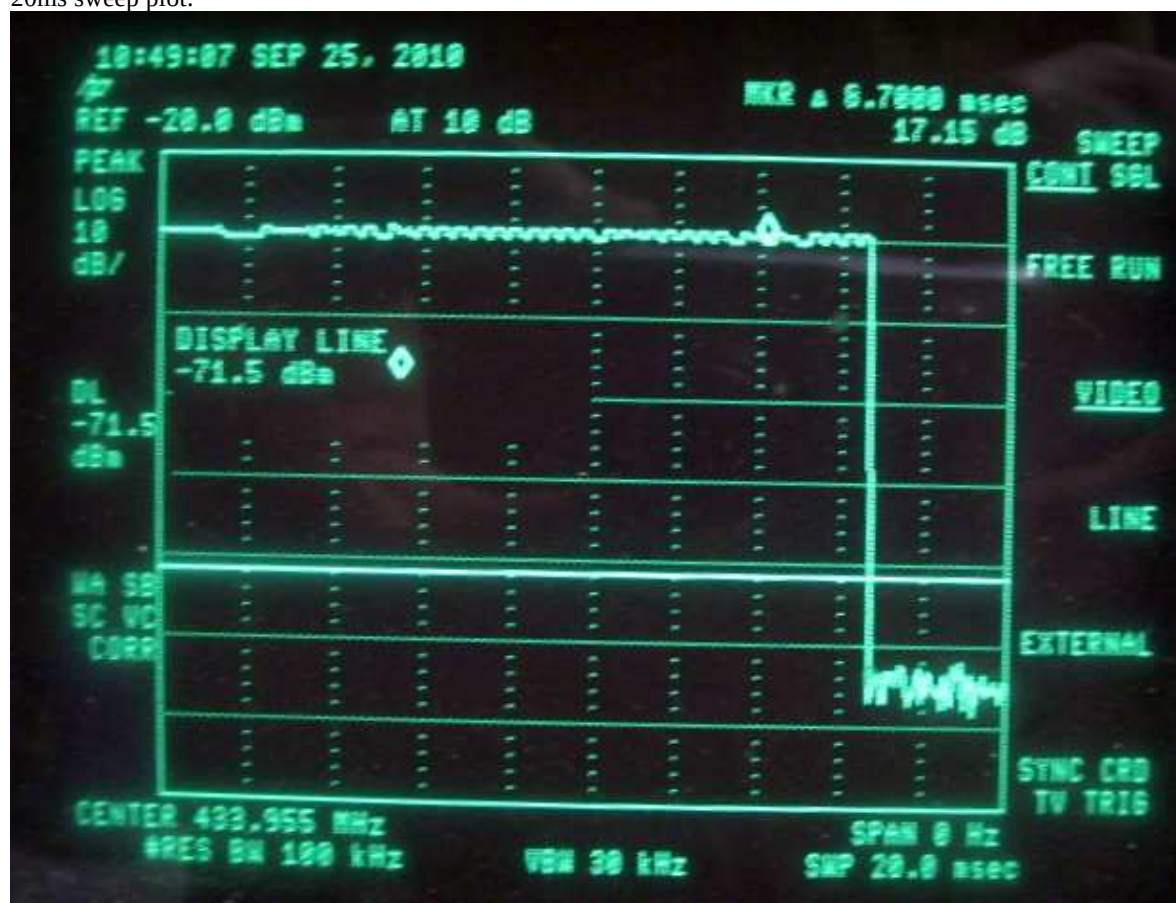
3.6.2. Duty Cycle Correction Factor and Resulting Limits

This transmitter uses FSK modulation on a 17.4 ms packet. The transmitted packets are limited to one packet in a 100ms period. The transmitter duty cycle over a 100ms time period is therefore 17.4%. The transmitter sends a single packet when a button is pressed and held. The transmission is not repeated until the user releases the button and presses it again. Therefore, plots below showing a single packet represent the entire packet train that is transmitted upon button press.

100ms sweep plot:



20ms sweep plot:



Calculating the allowed duty cycle correction factor as given in §15.35(c):

$$20 \cdot \log_{10}(17.4/100) = -15.19 \text{ dB}$$

This transmitter therefore qualifies for a 15.19 dB duty cycle correction factor per §15.35(c). Resulting radiated field strength limits are as follows:

Fundamental:	96.02 dBuV/m
Spurious:	76.02 dBuV/m
Restricted Band:	69.1 dBuV/m

3.6.3. Measured Radiated Field Strength Data

Measured radiated field strength data is shown in exhibit “Radiated Data.pdf”. Emissions from 0.009 MHz to the tenth harmonic were measured as per §15.33(a). Appropriate correction factors were applied to account for cable and other site-specific losses. The highest measurements are shown in the table for each frequency showing measurable signal.

The fundamental signal, at 86.99 dBuV/m, passed by 9.03 dB

The highest spurious signal was the sixth harmonic, at 58.9 dBuV/m which passed by 10.3 dB

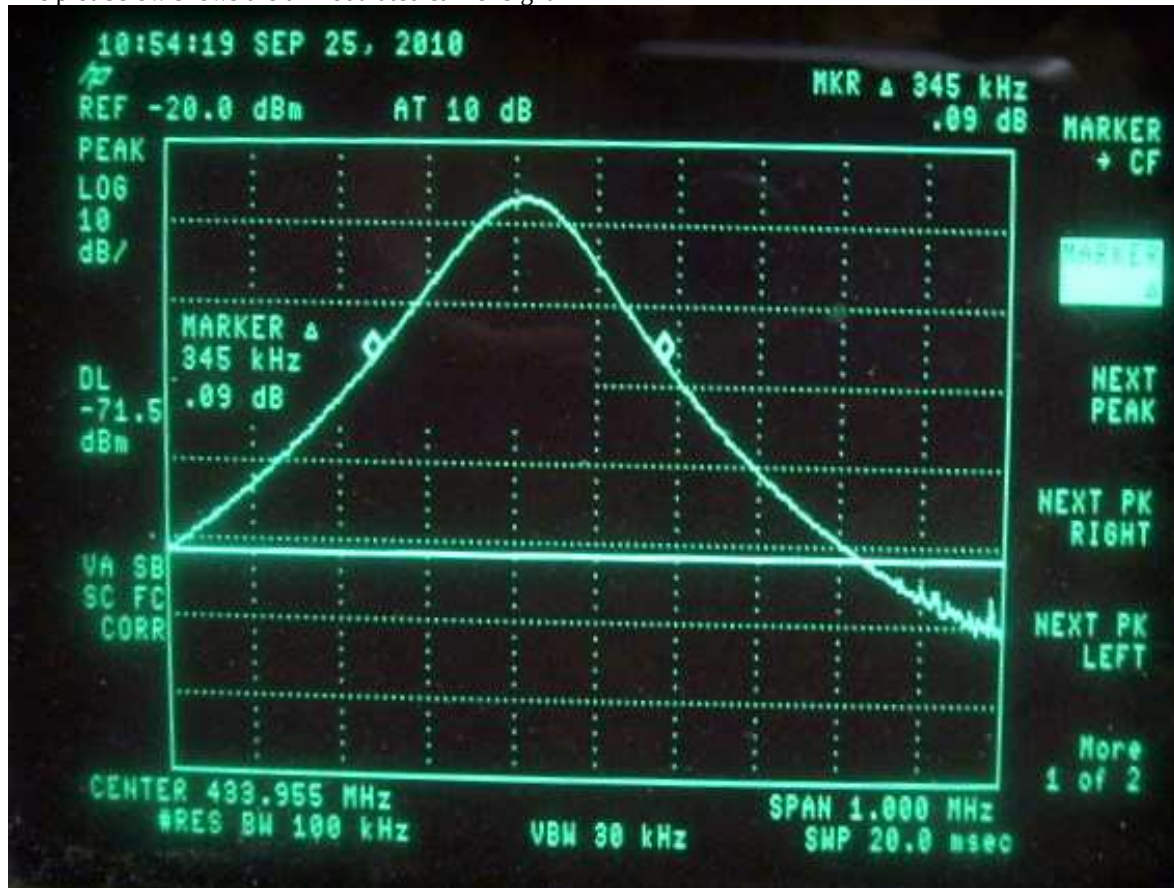
The highest restricted band signal was the tenth harmonic, at 54.9 dBuV/m which passed by 14.3 dB

3.7. FCC Part 15 §15.231(c)

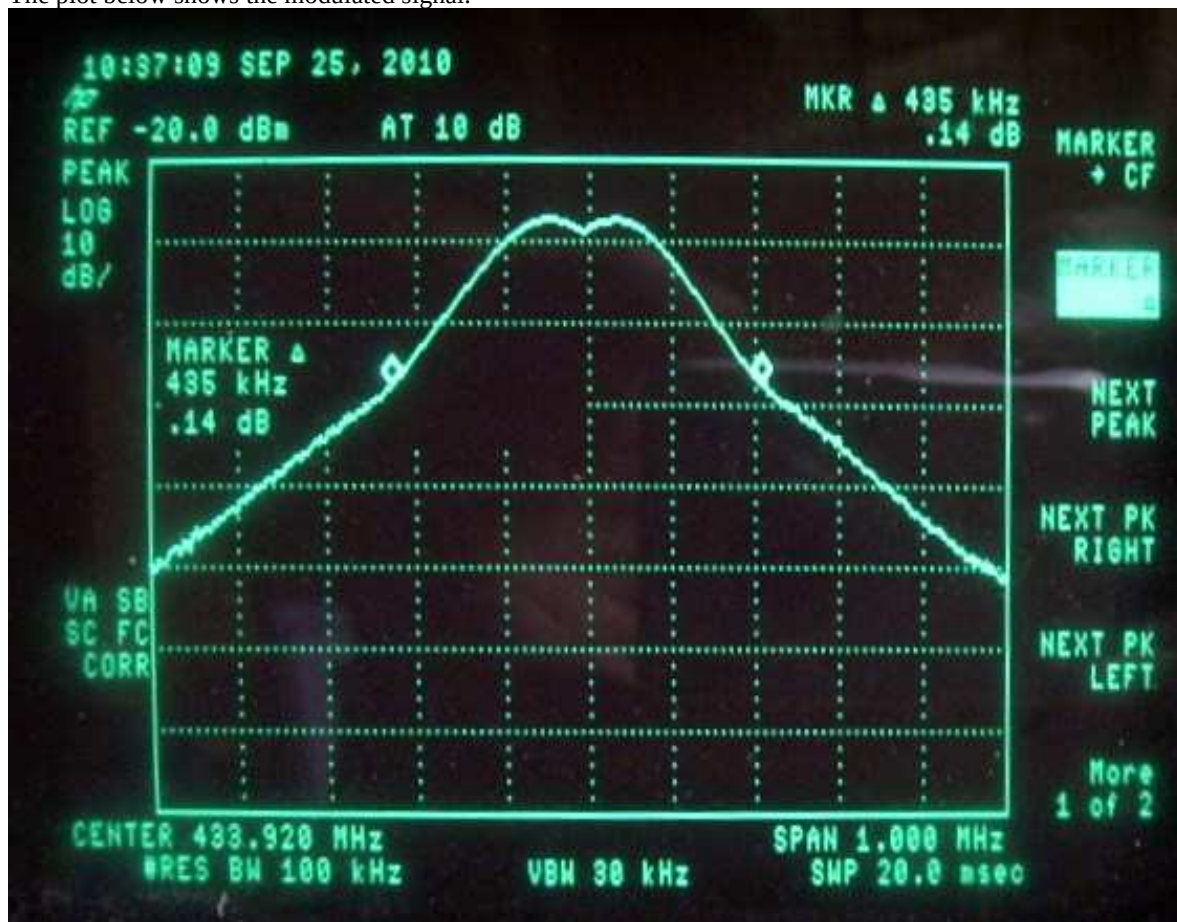
Allowed 20dB bandwidth of the transmitted signal is 0.25% of the carrier frequency.

BW Limit = $0.0025 \times 433.92 \text{ MHz}$
BW Limit = 1.085 MHz

The plot below shows the unmodulated carrier signal



The plot below shows the modulated signal.



Bandwidth of the modulated signal is 435 kHz

These measurements show compliance with the bandwidth requirements.