Safety Technology International, Inc.

FCC ID: TXL34151

Certification Test Report

2010-04-28

Contents

1. Introduction

The 34151 is a small sensor for use in a wireless alert system. The unit is powered by a 3V lithium battery. The device measures 4x4x7 inches and weighs approximately 8 ounces.

The device transmits packets for the purpose of alerting a user when a vehicle is passing the sensor. A microcontroller monitors the input for activations and transmits eight data packets when valid activations are detected. The input consists of a magnetometer and associated circuitry. In the absence of external activations, a set of three supervision transmissions is sent once per hour.

The transmitter circuit consists of a 433.92MHz SAW resonator, an oscillator transistor, an amplifier transistor, and associated passives. The amplifier stage is turned on and off to modulate the carrier. A bar antenna radiates the RF signal.

The transmitted packet is ASK modulated and has an on-time of 9.6 ms. Precautions are taken in the firmware to ensure that there is at least 100ms between packets.

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

A label shall be affixed to each piece of equipment, showing the FCC identifier. The label shall read "FCC ID: TXL34151". See Exhibit A for a photograph showing the label and location on the device.

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 2003
b) A description of utilized test equipment is contained in the report.

2.8. FCC Part 2 §2.948

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

Rhein Tech Laboratories, Inc.
360 Herndon Pkwy, Suite 1400
Herndon, VA 20170
Contact: Rick McMurray
Phone: 703-689-0368

A photograph of the test site is shown in Exhibit D

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:

Safety Technology International, Inc., 2306 Airport Road, Waterford, MI, 48327-1209

(2)

FCC Identifier is TXL34151

(3) Copy of the installation/user instructions is furnished in Exhibit E.

(4) A brief description of the device and operation is furnished in Exhibit I. Schematic is furnished in Exhibit G.

(5) Block diagram is furnished in Exhibit H.

(6) This document constitutes a technical test report.

(7) Internal and external photographs have been furnished in Exhibits A through D.

(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.

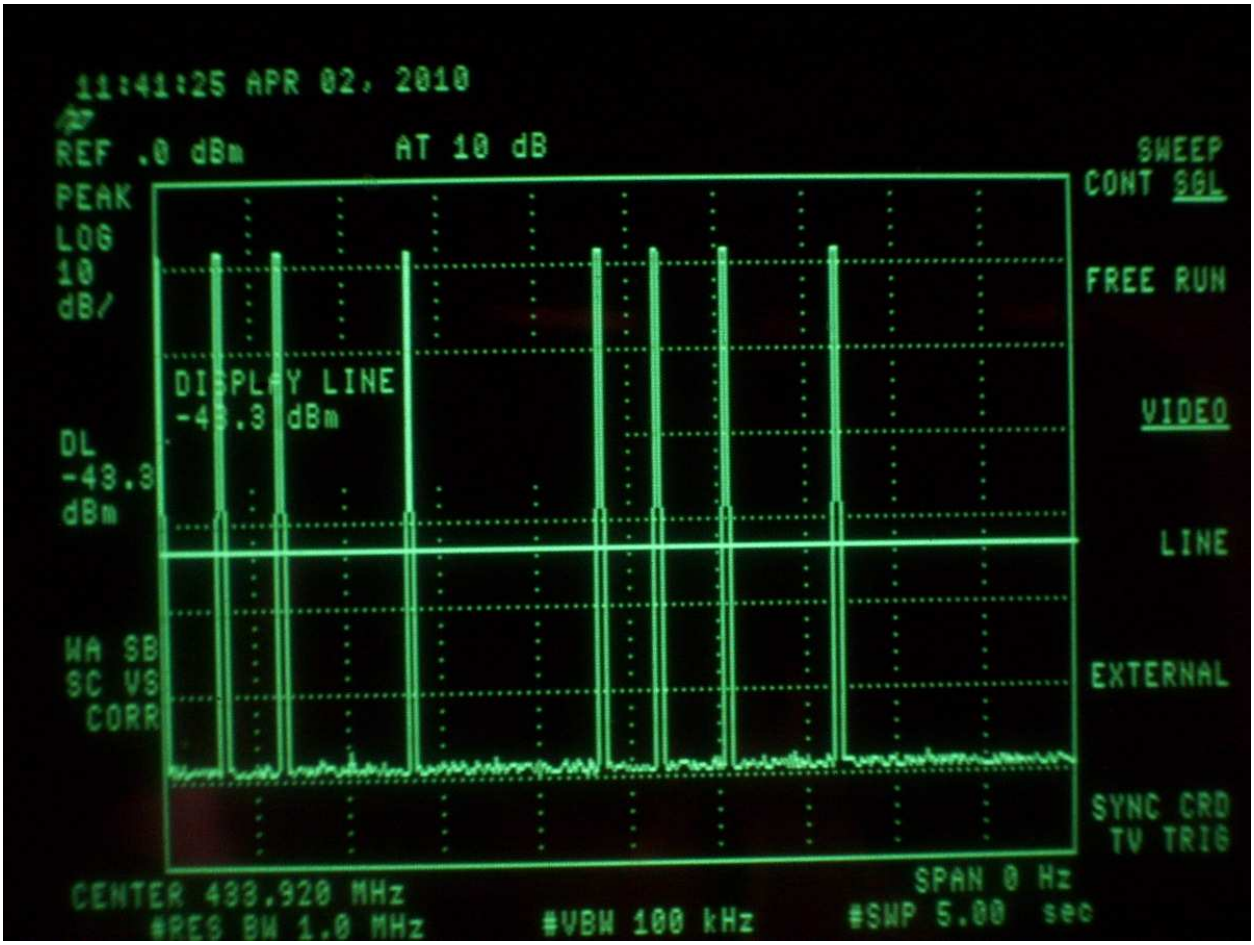
3. Discussion of Laboratory Measurements and Rules Compliance

3.1. FCC Part 15 §15.231(a)(1)

The device transmits packets for the purpose of alerting a user when a vehicle is passing the sensor. A microcontroller monitors the input for activations and transmits eight data packets when valid activations are detected. The input consists of a magnetometer and associated circuitry. Packets are 19.2 ms in length with a random interpacket spacing between 100 and 400 ms.

3.2. FCC Part 15 §15.231(a)(2)

A plot of the transmissions is shown below. This plot shows the transmissions occurring in a 5-second window as a result of one activation. The packets are shown to conclude within the 5-second window.



3.3. FCC Part 15 §15.231(a)(3)

In the absence of external activations, a set of three supervision transmissions is sent once per hour. Therefore, the total on time for the supervisory messages is [3]x[19.2 ms] = [57.6ms]. This is well under the allowed 2000 ms per hour.

3.4. FCC Part 15 §15.231(a)(4)

While this device is used in a security application, it does not continue transmitting beyond the packets resulting from each activation.

3.5. FCC Part 15 §15.231(a)(5)

While this device is used in a security application, there is no setup information transmitted with this device.

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 * 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:

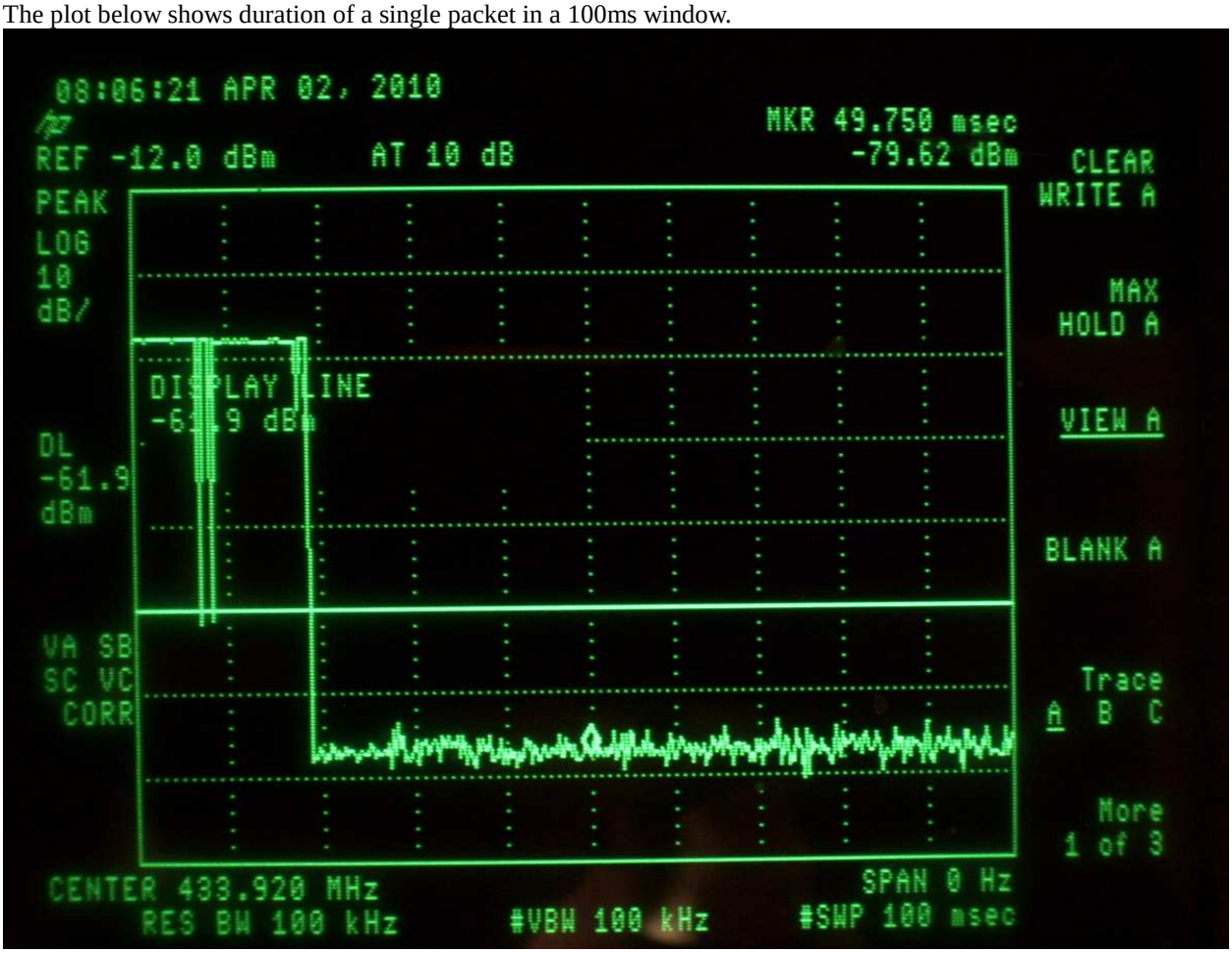
Restricted band limit = 500uV/m = 54dBuV/m.

3.6.2. Duty Cycle Correction Factor and Resulting Limits

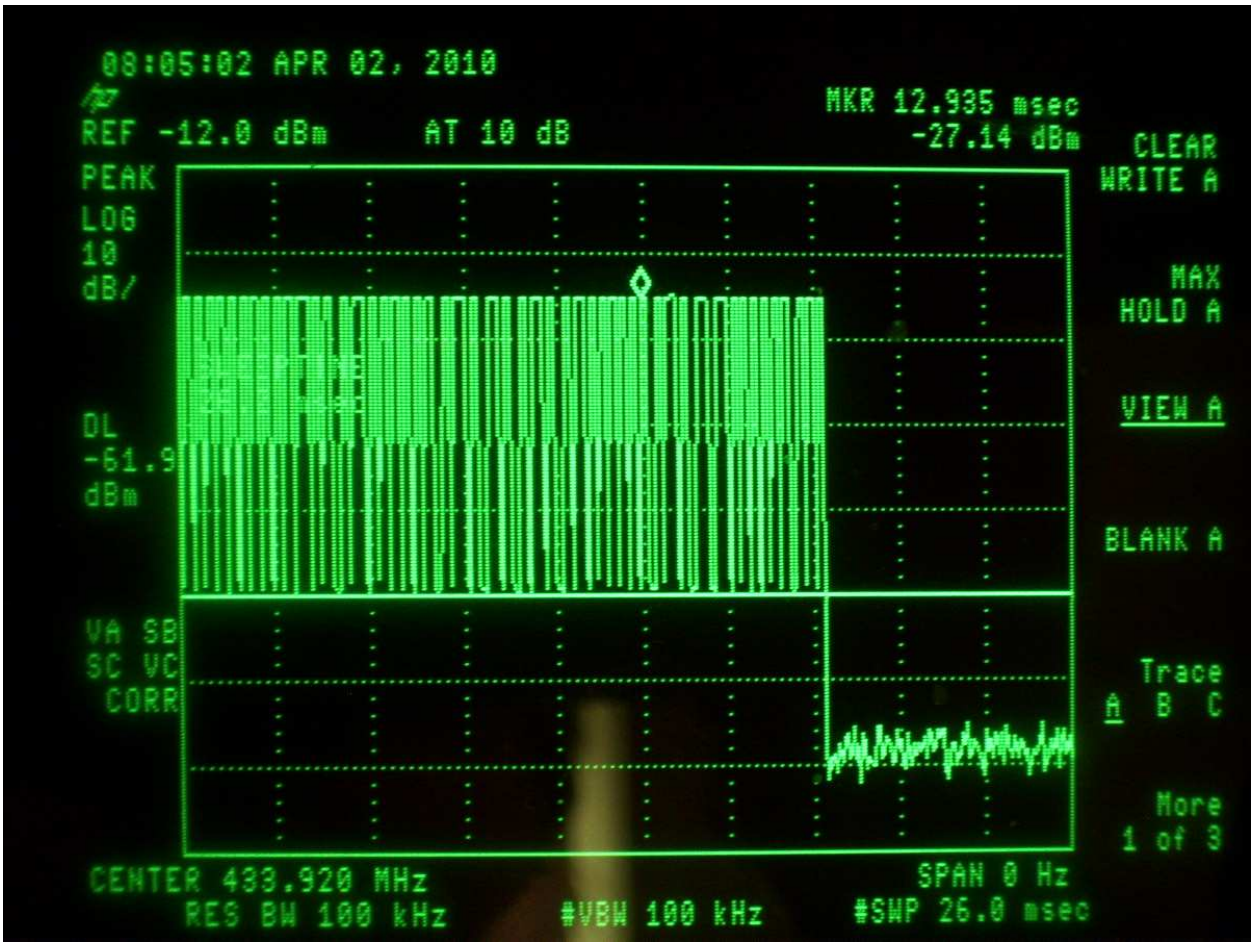
This transmitter uses ASK modulation. 64 bits are transmitted in each packet, and the "on" time for each bit is 150usec. The resulting "on" time per packet is 9.6ms. The transmitted packets are limited to one packet in a 100ms period. The transmitter duty cycle over a 100ms time period is therefore 9.6/100 = 9.6%.

Packet width measurements were made using Hewlett Packard Model 8591E Spectrum Analyzer (calibration due date 12/2/2010).

The plot below shows duration of a single packet in a 100ms window.



Plot below shows an expanded view of the transmitted packet.



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

20*log10(9.6/100) = -20.3dB

This transmitter therefore qualifies for the full 20 dB duty cycle correction factor allowed per §15.35(c). Resulting radiated field strength limits are as follows:

Fundamental:	**100.8 dBuV/m**
Spurious:	**80.8 dBuV/m**
Restricted Band:	**74.0 dBuV/m**

3.6.3. Measured Radiated Field Strength Data

Measured radiated field strength data is shown in Exhibit F. 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 97.5 dBuV/m, passed by 3.3 dB.
The highest spurious signal was the fifth harmonic, at 71.7 dBuV/m, which passed by 9.1 dB.
The highest restricted band signal was the third harmonic, at 66.4 dBuV/m, which passed by 7.6 dB.

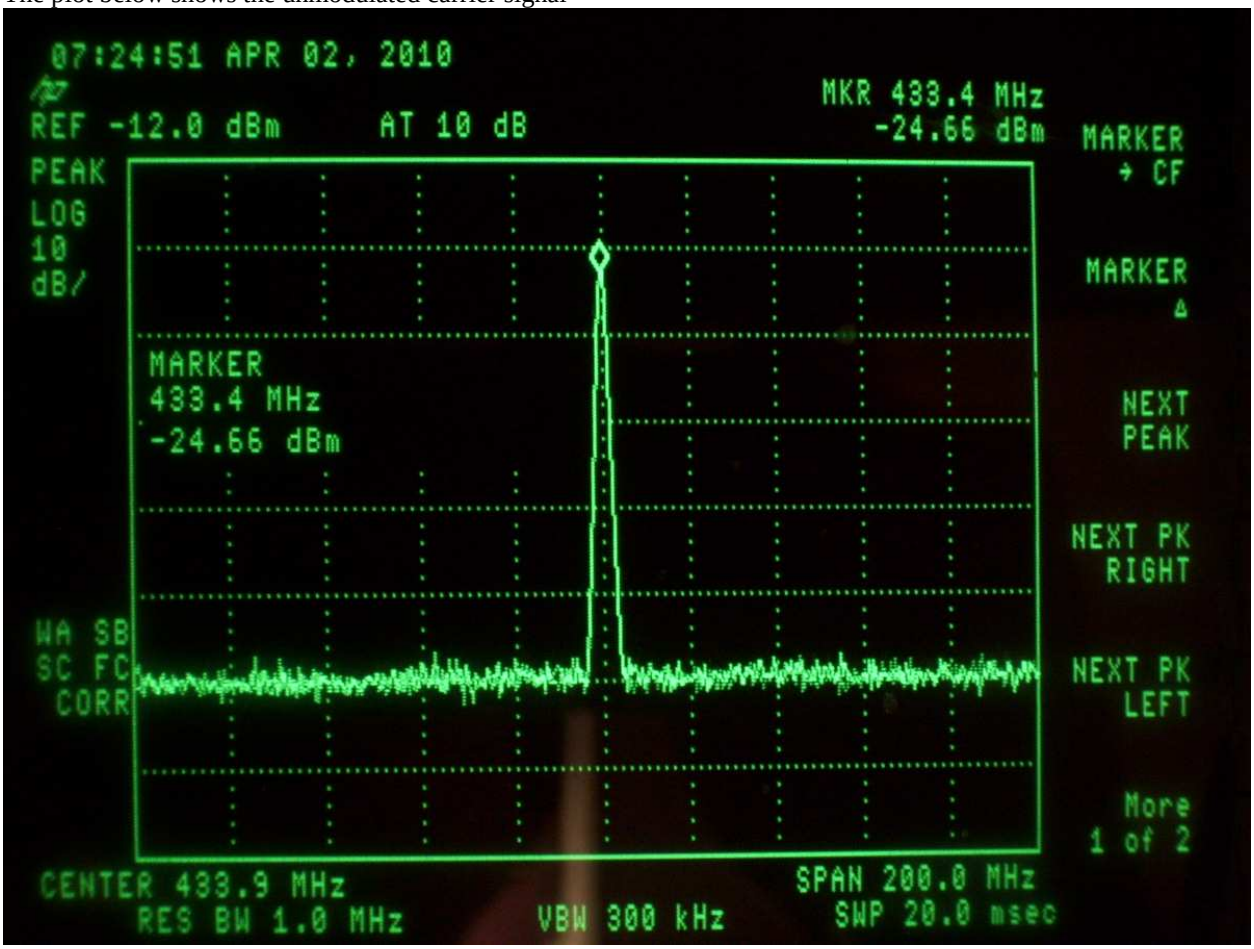
3.7. FCC Part 15 §15.231(c)

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

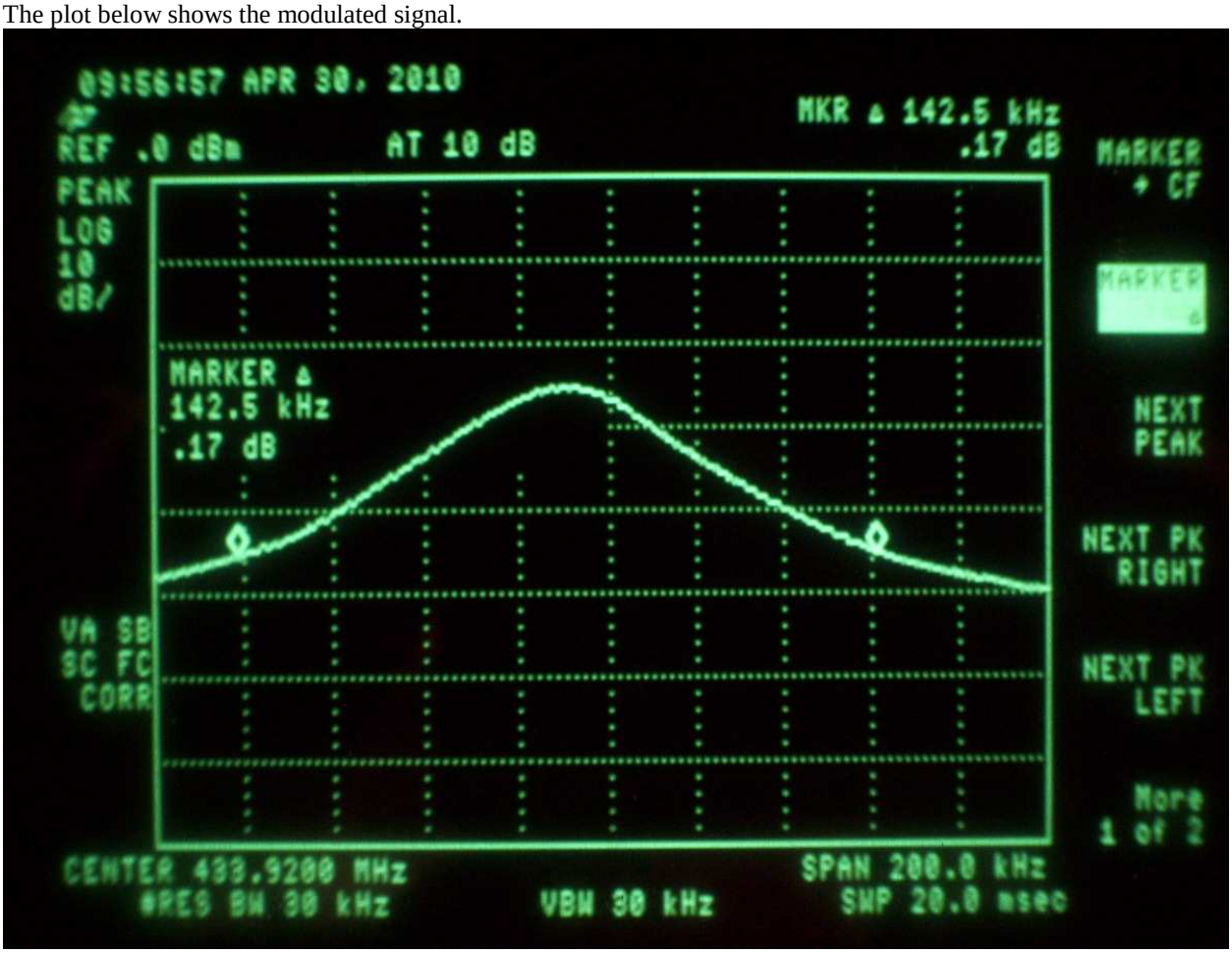
BW Limit = 0.0025*433.92MHz
BW Limit = 1.085MHz

Bandwidth measurements were made using Hewlett Packard Model 8591E Spectrum Analyzer (calibration due date 12/2/2010).

The plot below shows the unmodulated carrier signal



The plot below shows the modulated signal.



Bandwidth of the modulated signal is 143 kHz

These measurements show compliance with the bandwidth requirements.