



## COMPLIANCE WORLDWIDE INC. TEST REPORT 417-09

In Accordance with the Requirements of

Industry Canada RSS 210, Issue 7, Annex II  
Federal Communications Commission CFR Title 47 Part 15.231, Subpart C  
Low Power License-Exempt Radio Communication Devices  
Intentional Radiators  
Issued to

**Finish Line Product Development Services**

For

**EnerTrac, Inc.**  
**94 River Road, Suite 101**  
**Hudson, New Hampshire 03051**  
for

**433 MHz Tank Monitoring Device**

**FCC ID: X94-0003822**  
**IC: 8943A-003822**

**Report Issued on February 19, 2010**

**Prepared by**

  
\_\_\_\_\_  
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## 1. Scope

This test report certifies that the EnerTrac, Inc. 433 MHz Tank Monitoring Device, as tested, meets the RSS 210 Annex II Rules and FCC Part 15.231, Subpart C requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

## 2. Product Details

**2.1. Manufacturer:** EnerTrac, Inc.

**2.2. Model Number:** BigDrops, Part number 0003822

**2.3. Serial Number:** N/A

**2.4. Description:** Propane sensor

**2.5. Power Source:** One built-in 3.6 volt Lithium-Ion battery.

**2.6. EMC Modifications:** None

## 3. Product Configuration

### 3.1. Cables

Cable Type	Length	Shield	From	To
Sensor Cable	1 Meter		Attached to the DUT	N/A

### 3.2. Support Equipment

Device	Manufacturer	Model	Serial No.
No Support Equipment			

### 3.3. Operational Characteristics

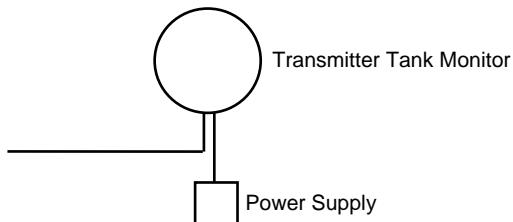
The unit under test is fully operational as soon as the supply voltage is applied. In order to facilitate testing, the built-in 3.6 volt lithium battery was replaced with an external power supply. In addition, the device firmware was modified to reduced the time between transmit cycles from the normal once per hour operation to approximately once every 10 seconds. This retrofit was performed to maintain the maximum transmitter output level and eliminate the need to continually replace the built-in battery which lasted less than an hour under these operating conditions.

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### 3. Product Configuration (continued)

#### 3.4. Block Diagram



### 4. Measurements Parameters

#### 4.1 Measurement Equipment Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
Spectrum Analyzer	Agilent	E4407B	MY4510449	7/09/2010
Microwave Preamp	Hewlett Packard	8449B	3008A01323	9/22/2010
Bilog Antenna	Com-Power	AC-220	25509	8/6/2010
Horn Antenna	Electro-Metrics	EM-6961	6337	7/22/2010
Band Pass Filter	Mini-Circuits	VHP-16	0341	11/27/2010

#### 4.2 Measurement & Equipment Setup

Test Date:	1/4/2010 to 2/15/2010
Test Engineer:	Brian F Breault
Site Temperature (°C):	20.6
Relative Humidity (%RH):	30
Frequency Range:	30 MHz to 4.4 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	120 kHz (30 MHz – 1 GHz) 1 MHz (>1 GHz)
EMI Receiver Avg Bandwidth:	300 kHz (30 MHz – 1 GHz) 3 MHz (>1 GHz)
Detector Functions:	Peak, Quasi-Peak and Average
Antenna Height:	1 to 4 meters

#### 4.3 Test Procedure

Test measurements were made in accordance FCC Part 15.231: Operation within the bands 40.66 – 40.70 MHz and above 70 MHz.

The test methods used to generate the data in this test report are in accordance with ANSI C63.4: 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

The manufacturer declares that the device under test will always be operated with the widest part of the cone facing down. Therefore, exploratory radiated emission measurements in accordance with ANSI C63.4-2003, section 13.1.4.1 c) was not necessary.

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## 5. Measurement Summary

Test Requirement	FCC Requirement	Test Report Section	Result	Comment
Antenna Requirement	15.203	6.1	Compliant	Unit has a permanently mounted internal antenna.
Operational Requirements	15.231 (a)(1)	6.2.1	Not Required	This clause does not apply to the unit under test.
	15.231 (a)(2)	6.2.2	Compliant	
	15.231 (a)(3)	6.2.3	Compliant	
	15.231 (a)(4)	6.2.4	Not Required	This clause does not apply to the unit under test.
	15.231 (a)(5)	6.2.5	Not Required	This clause does not apply to the unit under test.
Radiated Field Strength of Fundamental	15.231 (b)	6.3	Compliant	
Radiated Field Strength of Harmonics	15.231 (b)(3)	6.4	Compliant	
Spurious Radiated Emissions	15.231 (b)(3), 15.209	6.5	Compliant	
Emission Bandwidth	15.231 (c)	6.6	Compliant	
Bandwidth of Momentary Signals	IC RSS-210 A1.1.3	6.7	Compliant	
Conducted Emissions	15.207	---	Not Required	Unit is battery operated
Determination of Average Factor (Duty Cycle)	15.35 (c)	---	Not Required	

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## 6. Measurement Data

### 6.1. Antenna Requirement (Section 15.203)

Requirement: 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.

Status: The unit under test employs a permanent, internally mounted antenna.

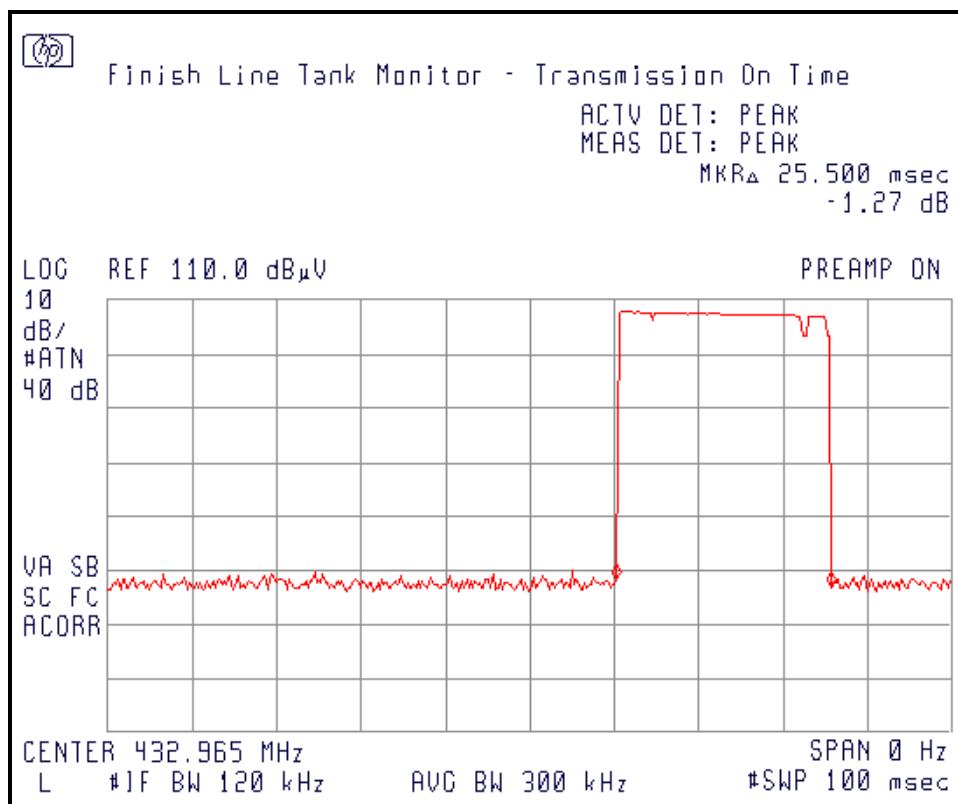
### 6.2. Operational Requirements (Section 15.231(a))

6.2.1. Requirement: A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released (Section 15.231(a)(1)).

Status: This clause does not apply to the unit under test.

6.2.2. Requirement: A transmitter activated automatically shall cease transmission within 5 seconds after activation (Section 15.231(a)(2)).

Status: The unit under test transmits for 25.5 milliseconds after activation.



## 6. Measurement Data (continued)

### 6.2. Operational Requirements (Section 15.231(a)) (continued)

6.2.3. Requirement: 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 (Section 15.231(a)(3)).

Status: The unit under test produces a transmission of 25.5 milliseconds in duration. The manufacturer states that the unit transmits once per hour.

6.2.4. Requirement: 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. (Section 15.231(a)(4)).

Status: This clause does not apply to the unit under test.

6.2.5. Requirement: 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 transmission 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.

Status: This clause does not apply to the unit under test.

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## 6. Measurement Data (continued)

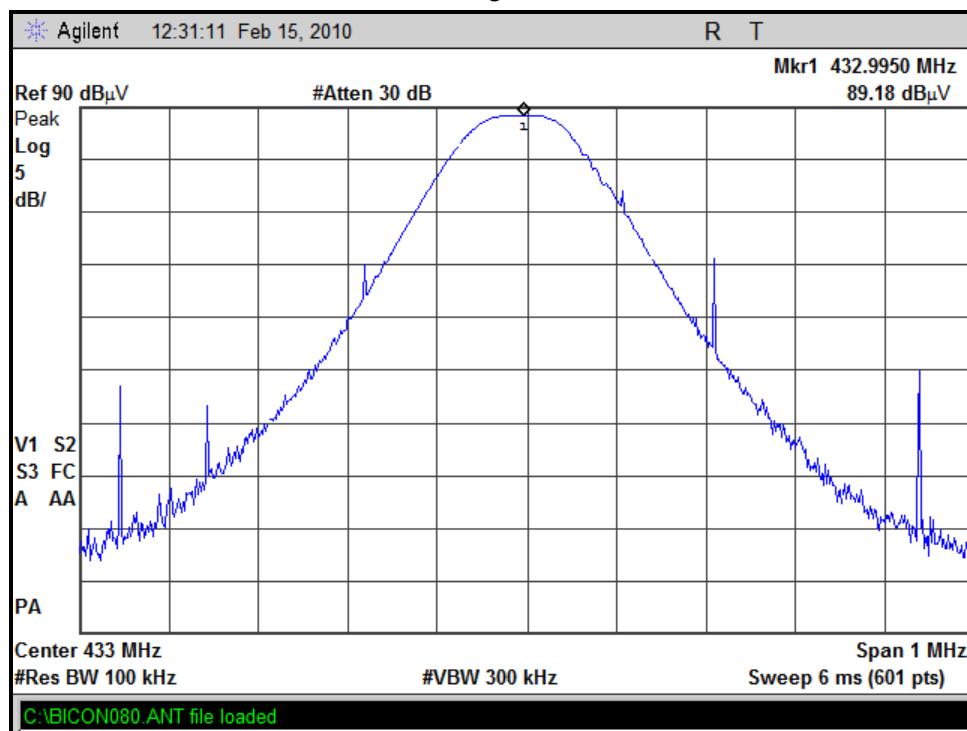
### 6.3. Radiated Field Strength of Fundamental (15.231, Section (b))

Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operated within the 260-470 MHz frequency bands shall comply with the limits specified in FCC Part 15.231, Section (b).

Site Temperature: 22.4°C Site Humidity: 31% RH

Freq.	Amplitude (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Margin (dB)		Ant Pol.	Ant Ht.	Turntable Azimuth	Result
	Peak	Avg.	Peak	Avg.	Peak	Avg.				
433	89.18	49.70	92.84	72.84	-3.7	-23.1	H	100	224	Compliant
	88.32	49.72	92.84	72.84	-4.5	-23.1	V	171	244	Compliant

#### 6.3.1. Worst Case Radiated Field Strength of Fundamental



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## 6. Measurement Data (continued)

### 6.4. Radiated Field Strength of Harmonics (15.231, Section (b))

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operated within the 260-470 MHz frequency band shall comply with the limits specified in FCC Part 15.231, Section (b). Peak field strength may not be greater than 20 dB above the average limit.

#### 6.4.1. Harmonics < 1 GHz

Frequency (MHz)	Amplitude (dB $\mu$ V/m)		Q-P Limit	Margin (dB)	Ant Pol	Ant Ht	TT Pos	Result
	Peak	QP			H/V	cm	Deg	
866.00	70.76	51.28	52.84	-1.56	V	131	340	Compliant

#### 6.4.2. Harmonics > 1 GHz

Frequency (MHz)	Amplitude (dB $\mu$ V/m)		Average Limit	Margin (dB)	Ant Pol	Ant Ht	TT Pos	Result
	Peak	Avg			H/V	cm	Deg	
1299.00	70.76	51.28	52.84	-1.56	V	157	300	Compliant
1732.00	68.17	47.90	52.84	-4.94	V	126	134	Compliant
2165.00	70.08	50.61	52.84	-2.23	H	117	90	Compliant
2598.00	69.68	49.73	52.84	-3.11	H	100	230	Compliant
3031.00	57.91	36.68	52.84	-16.16	V	105	110	Compliant
3464.00	59.49	36.28	52.84	-16.56	V	112	284	Compliant
3897.00 <sup>1</sup>	58.24	37.62	52.84	-15.22	H	106	10	Compliant
4330.00 <sup>1</sup>	58.45	38.00	52.84	-14.84	V	104	85	Compliant

<sup>1</sup> Frequency falls within the Restricted Bands of Operation. See FCC Part 15, Section 15.205 for additional information.

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## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions, 30 MHz to 4.4 GHz (15.231, Section (b))

Requirement: 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 Section 15.209, whichever is the lesser attenuation.

#### 6.5.1. Spurious Radiated Emissions Test Setup

##### 6.5.1.1. Regulatory Limit: FCC Part 209, Quasi-Peak

Frequency Range (MHz)	Distance (Meters)	Limit (dB $\mu$ V/m)
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
Above 960	3	54.0

##### 6.5.1.2. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

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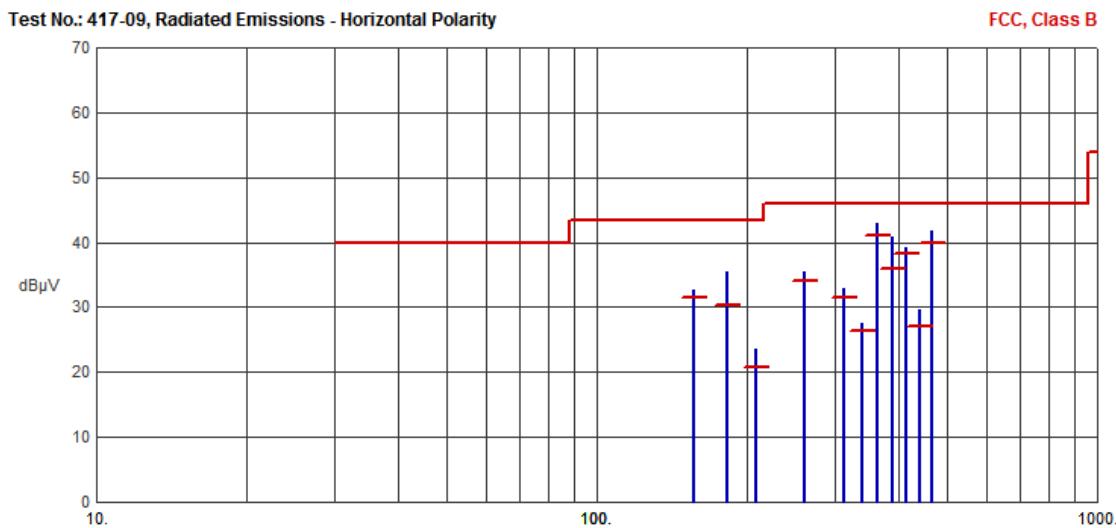
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## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions, 30 MHz to 4.4 GHz (15.231, Section (b))

#### 6.5.2. Spurious Radiated Emissions, 30 MHz to 1 GHz Test Results

##### 6.5.2.1. Horizontal Polarity



Frequency (MHz)	Pk Amp (dB $\mu$ V/m)	QP Amp (dB $\mu$ V/m)	QP Limit (dB $\mu$ V/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
155.9900	32.72	31.55	43.50	-11.95	N/A	N/A	
181.9919	35.48	30.38	43.50	-13.12	N/A	N/A	
207.9789	23.60	20.74	43.50	-22.76	N/A	N/A	
259.9802	35.35	34.14	46.00	-11.86	N/A	N/A	
311.9896	32.84	31.46	46.00	-14.54	N/A	N/A	
337.9864	27.50	26.48	46.00	-19.52	N/A	N/A	
363.9794	42.85	41.17	46.00	-4.83	N/A	N/A	
389.9853	40.79	35.87	46.00	-10.13	N/A	N/A	
415.9894	39.27	38.20	46.00	-7.80	N/A	N/A	
441.9682	29.64	27.11	46.00	-18.89	N/A	N/A	
467.9833	41.73	39.94	46.00	-6.06	N/A	N/A	

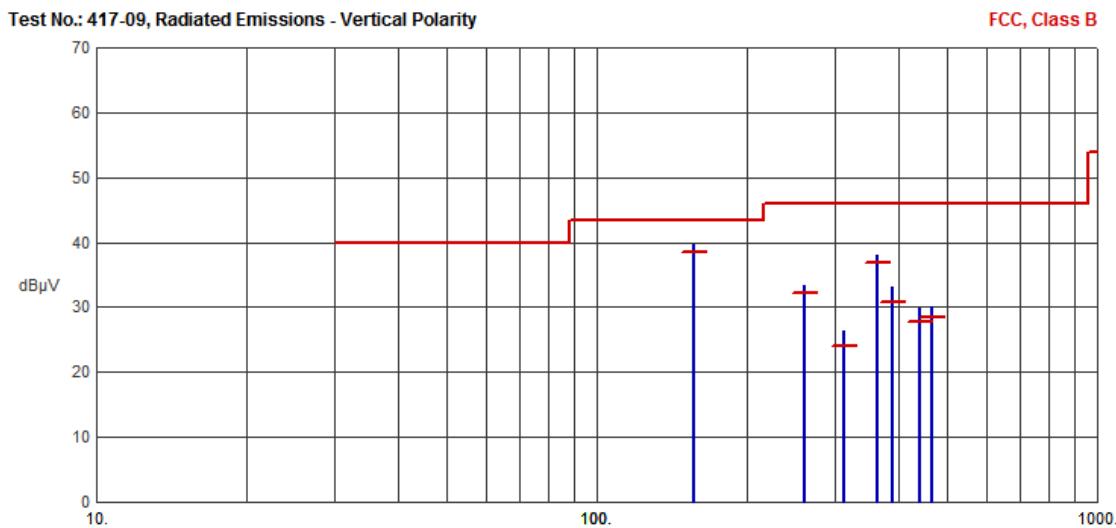
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## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions, 30 MHz to 4.4 GHz (15.231, Section (b))

#### 6.5.2. Spurious Radiated Emissions, 30 MHz to 1 GHz Test Results (continued)

##### 6.5.2.2. Vertical Polarity



Frequency (MHz)	Pk Amp (dB $\mu$ V/m)	QP Amp (dB $\mu$ V/m)	QP Limit (dB $\mu$ V/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
155.9629	39.59	38.39	43.50	-5.11	N/A	N/A	
259.9949	33.29	32.16	46.00	-13.84	N/A	N/A	
311.9230	26.44	24.14	46.00	-21.86	N/A	N/A	
363.9896	37.99	36.88	46.00	-9.12	N/A	N/A	
389.9771	33.20	30.71	46.00	-15.29	N/A	N/A	
441.9772	29.91	27.74	46.00	-18.26	N/A	N/A	
467.9928	30.01	28.35	46.00	-17.65	N/A	N/A	

#### 6.5.3. Spurious Radiated Emissions, >1 GHz Test Results

There were no measurable spurious emissions other than the harmonic emissions detailed in section 6.4.2.

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## 6. Measurement Data (continued)

### 6.6. Occupied Bandwidth

Requirement: 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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Site Temperature: 22.4°C Site Humidity: 31% RH

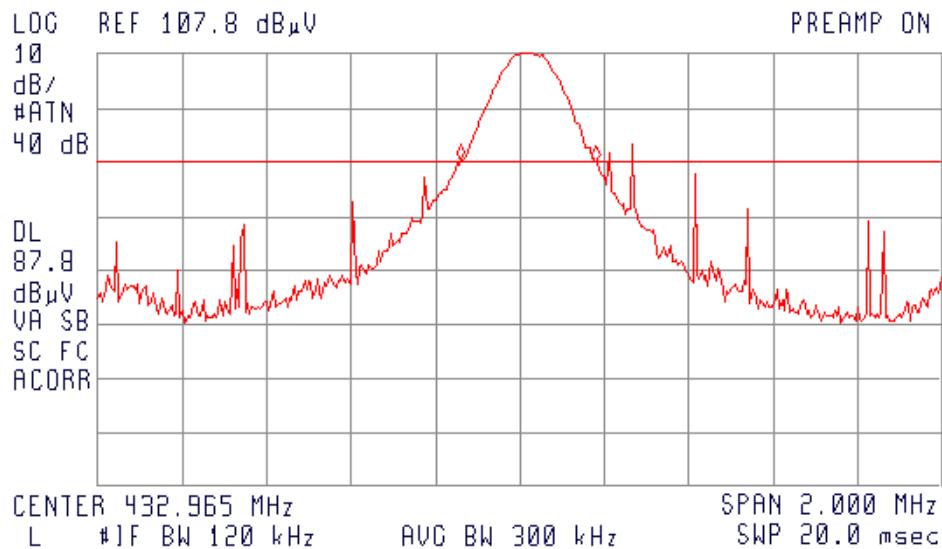
Fundamental Frequency (MHz)	-20 dB Bandwidth (MHz)	Limit (MHz)	Result
432.97	0.320	1.083	
			Compliant



Finish Line Tank Monitor - 20 dB Bandwidth

ACTV DET: PEAK  
MEAS DET: PEAK

MKR<sub>A</sub> 320 kHz  
-.27 dB



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## 6. Measurement Data (continued)

### 6.7. Bandwidth of Momentary Signals (IC RSS-210 A1.1.3)

Requirement: The 99% bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz - 900 MHz.

Site Temperature: 22.4°C      Site Humidity: 31% RH

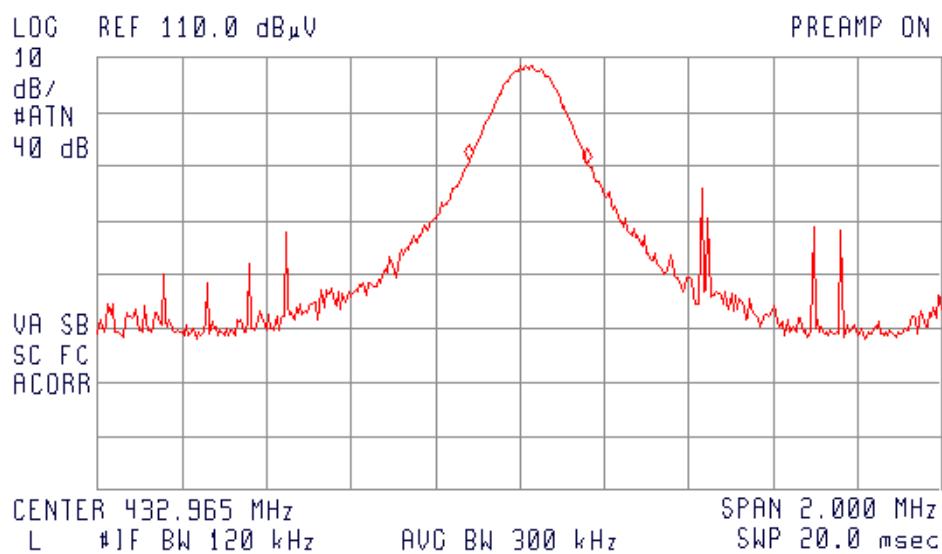
Fundamental Frequency (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Result
432.97	0.280	1.083	Compliant



Finish Line Tank Monitor - 99% Bandwidth

ACTV DET: PEAK  
MEAS DET: PEAK

MKR<sub>A</sub> 280 kHz  
-.46 dB





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## 7. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC) and Industry Canada standards. A description of the test sites is on file with the FCC (registration number **96392**) and Industry Canada (file number **IC 3023**).

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.