



Flom Test Labs
EMI, EMC, RF Testing Experts Since 1963

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Date: December 12, 2005

Federal Communications Commission
Via Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Nuvo Technologies Inc
Equipment: Drink Measuring TX
FCC ID: Q4601
FCC Rules: 15.231

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

Filing fees are attached.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,

David E. Lee, Quality Assurance Manager

enclosure(s)
cc: Applicant
DEL/del



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Transmitter Certification

of

FCC ID: Q4601
Model: Drink Measuring TX

to

Federal Communications Commission

Rule Part 15.231

Date of report: December 12, 2005

On the Behalf of the Applicant:

Nuvo Technologies, Inc.

At the Request of:

P.O. Deposit Check #11205

Nuvo Technologies, Inc.
6060 E. Thomas Road
Scottsdale, AZ 85251

Attention of:

Adam Studnicki, CEO
480-222-6000
E-mail: astudnicki@nuvoinc.com
Chris Morrison
E-mail: chrismorrison@nuvoinc.com
John Marinick

Supervised By:

David E. Lee, Quality Assurance Manager

List Of Exhibits

(FCC **Certification** (Transmitters) - Revised 9/28/98)

Applicant: Nuvo Technologies Inc

FCC ID: Q4601

By Applicant:

1. Letter Of Authorization
2. Identification Drawings
 - Label
 - Location of Label
 - Compliance Statement
 - Location of Compliance Statement
3. Documentation: 2.1033(B)
 - (3) User Manual
 - (4) Operational Description
 - (5) Block Diagram
 - (5) Schematic Diagram
 - (7) Photographs
 - Parts List

By M.F.A. Inc.

- A. Testimonial & Statement of Certification

The Applicant has been cautioned as to the following:

15.21 Information to User.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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2.1033(c)	General Information Required	2
	Standard Test Conditions and Engineering Practices	5
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2.1051	Unwanted Emissions (Transmitter Conducted)	9
2.202(g)	Necessary Bandwidth and Emission Bandwidth	18

Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

a) **Test Report**

b) Laboratory: M. Flom Associates, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044) Chandler, AZ 85225

c) Report Number: d0520048

d) Client: Nuvo Technologies Inc

e) Identification: Drink Measuring TX
FCC ID: Q4601
Description: Drink Measuring System

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: December 12, 2005
EUT Received: February 21, 2005

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:



David E. Lee, Quality Assurance Manager

n) Results: The results presented in this report relate only to the item tested.

o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

List Of General Information Required For Certification

In Accordance With FCC Rules And Regulations,
Volume II, Part 2, 15.231 and Confidentiality

Sub-part 2.1033

(c)(1): **Name and Address of Applicant:**

Nuvo Technologies Inc

Manufacturer:

Applicant

(c)(2): **FCC ID:** Q4601

Model Number: Drink Measuring TX

(c)(3): **Instruction Manual(s):**

Please See Attached Exhibits

(c)(4): Type of Emission: Digital

(c)(5): **Frequency Range, MHz:** 0.433

(c)(6): **Power Rating:** 6.708 mV/m
☐ Switchable ☐ Variable ☒ N/A

(c)(7): **Maximum Power Rating:** 10.708 mV/m @ 3m

15.203: **Antenna Requirement:**

- ☒ The antenna is permanently attached to the EUT
☐ The antenna uses a unique coupling
☐ The EUT must be professionally installed
☐ The antenna requirement does not apply

Subpart 2.1033 (continued)

(c)(8): **Voltages & currents in all elements in final RF stage, including final transistor or solid state device:**

Collector Current, mA	=	<100
Collector Voltage, Vdc	=	3.2
Supply Voltage, Vdc	=	3.6

(c)(9): **Tune-Up Procedure:**

Please See Attached Exhibits

(c)(10): **Circuit Diagram/Circuit Description:**

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please See Attached Exhibits

(c)(11): **Label Information:**

Please See Attached Exhibits

(c)(12): **Photographs:**

Please See Attached Exhibits

(c)(13): **Digital Modulation Description:**

☐	ATTACHED EXHIBITS
☒	N/A

(c)(14): **Test and Measurement Data:**

Follows

Sub-part

2.1033(b):

Test And Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.1031, 2.1033, 2.1035, 2.1041, 2.1043, 2.1045, and the following individual Parts:

_____	15.209	Radiated emission limits; general requirements
_____	15.211	Tunnel radio systems
_____	15.213	Cable locating equipment
_____	15.214	Cordless telephones
_____	15.217	Operation in the band 160-190 kHz
_____	15.219	Operation in the band 510-1705 kHz
_____	15.221	Operation in the band 525-1705 kHz (leaky coax)
_____	15.223	Operation in the band 1.705-10 MHz
_____	15.225	Operation in the band 13.553-13.567 MHz
_____	15.227	Operation in the band 26-27.28 MHz (remote control)
_____	15.229	Operation in the band 40.66-40.70 MHz
X _____	15.231	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz
_____	15.233	Operation within the bands 43.71-44.49, 46.60-46.98 MHz 48.75-49.51 MHz and 49.66-50.0 MHz
_____	15.235	Operation within the band 49.82-49.90 MHz
_____	15.237	Operation within the bands 72.0-73.0 MHz, 74.6-74.8 MHz and 75.2-76.0 MHz (auditory assistance)
_____	15.239	Operation in band 88-108 MHz
_____	15.241	Operation in the band 174-216 MHz (biomedical)
_____	15.243	Operation in the band 890-940 MHz (materials)
_____	15.245	Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz, and 24075-24175 MHz (filed disturbance sensors)
_____	15.247	Operation within bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz (spread spectrum)
_____	15.249	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0- 24.25 GHz
_____	15.251	Operation within the bands 2.9-3.26 GHz, 3.267-3.332 GHz, 3.339-3.3458 GHz, and 3.358- 3.6 GHz (vehicle identification systems)
_____	15.321	Specific requirements for asynchronous devices operating in the 1910-1920 MHz and 2390- 2400 MHz bands (Unlicensed PCS)
_____	15.323	Specific requirements for isochronous devices operating in the 1920-1930 MHz sub-band (Unlicensed PCS)

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992/2003, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst-case measurements.



A2LA

"A2LA has accredited M. Flom Associates, Inc. Chandler, AZ for technical competence in the field of Electrical Testing. The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 'General Requirements for the Competence of Testing and Calibration Laboratories' and any additional program requirements in the identified field of testing."

Certificate Number: **2152-01**

Name of Test: Signaling Restriction

Specification: 47 CFR 15.231(a)

Provisions

To Paragraph 15.231

The EUT has several modes of operation:

- 1) When the two buttons on the device are pressed simultaneously an EVENT is created and 4 pulse trains of information are transmitted under 15.231(a) rules.
- 2) When the unit is tilted an EVENT is created and 4 pulse trains of information are transmitted under 15.231(a) rules.
- 3) When no EVENT is activated the unit transmits stored data under 15.231(e) rules.

(a) Types of momentary signals

X The EUT meets the requirements provided in (e).

(a)(1) Manually operated transmitters

The EUT cannot be manually activated.

X The EUT ceases transmission within 5 seconds or deactivation.

 The EUT is employed during emergencies.

(a)(2) Automatically activated transmitters

The EUT can not be automatically activated.

X The EUT does not transmit for more than 5 seconds.

 The EUT only operates during an alarm condition.

(a)(3) Automatically activated transmitters

The EUT does not transmit at regular predetermined intervals.

X The EUT meets the requirements provided in (e).

 The EUT does not transmit more than one, one second per hour.

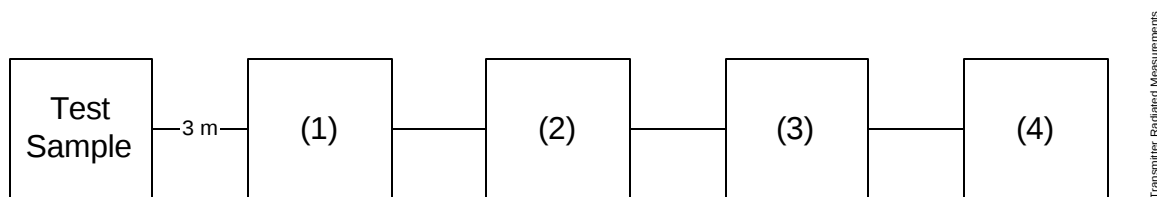
(a)(4) Emergency transmitters

X The EUT is not an emergency transmitter.

 The EUT only operates during an alarm condition.

Name of Test: RF Power Output (Radiated)

Transmitter Radiated Measurements



Asset (as applicable)	Description	s/n	Cycle	Last Cal
Per ANSI C63.4-1992, 10.1.4				
(1) Transducer				
X i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Sep-05
X i00089	Apriel 2001 200MHz-1GHz	001500	12 mo.	Sep-05
(2) Coaxial Attenuator (if required)				
(3) Preamp				
i00028	HP 8449A (+30 dB)	2749A00121	12 mo.	Mar-05
(4) Spectrum Analyzer				
i00048	HP 8566B	2511A01467	12 mo.	Jun-05
i00029	HP 8563E	3213A00104	12 mo.	May-05

Name Of Test: Field Strength of Fundamental Radiation
g0520105: 2005-Feb-21 Mon 09:01:00
State: 2:High Power

Rule Part	Frequency Emission, MHz	Meter, dBuV	CF, dB	uV/m @ 3m	QP, Avg, or Peak	Limit, uV/m @ 3m
15.231(a)	433.278800	48.49	18.06	2125.69	Peak	10708.00

Name Of Test: Field Strength of Harmonically Related Spurious
g0520105: 2005-Feb-21 Mon 09:01:00
State: 2:High Power

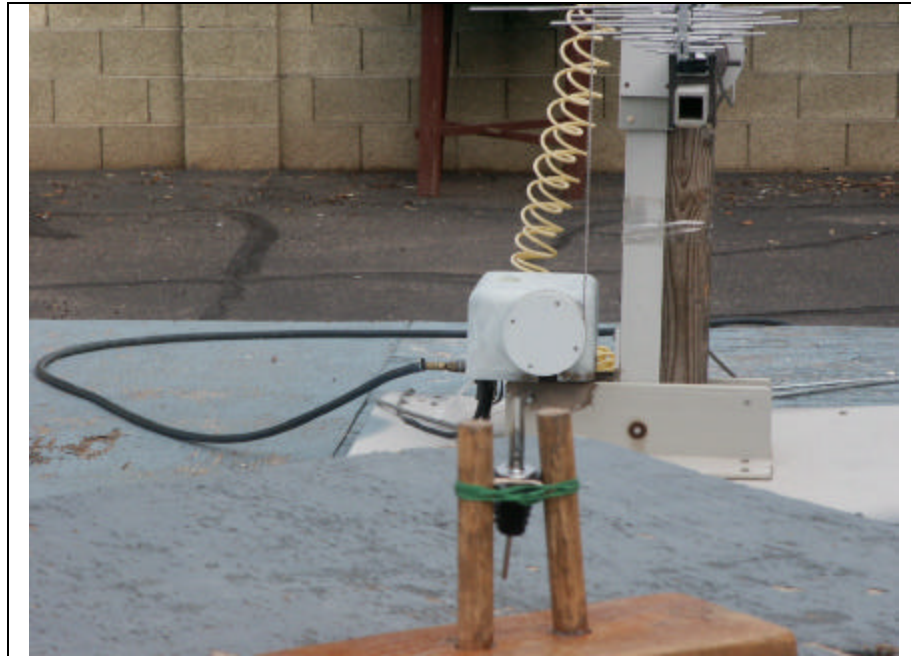
Rule Part	Frequency Emission, MHz	Meter, dBuV	CF, dB	uV/m @ 3m	QP, Avg, or Peak	Limit, uV/m @ 3m
15.231(a)	866.553800	19.79	25.79	190.11	Peak	1070.80
15.231(e)	866.553800	19.79	25.79	190.11	Peak	1070.80
15.231(e)	1299.860900	19.98	26.75	217.02	Peak	1070.80
15.231(e)	1733.140900	13.19	30.92	160.51	Peak	1070.80
15.231(e)	2166.420900	11.1	31.96	142.23	Peak	1070.80
15.231(e)	2599.700900	10.85	32.76	151.53	Peak	1070.80
15.231(e)	3032.980900	11.5	32.65	161.25	Peak	1070.80
15.231(e)	3466.260900	10.73	35.36	201.60	Peak	1070.80

Test Setup: Radiated Emissions

State:



State:



Name of Test: Occupied Bandwidth

Specification: 47 CFR 2.1049(c)(1)

Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.11

Test Equipment: As per attached page

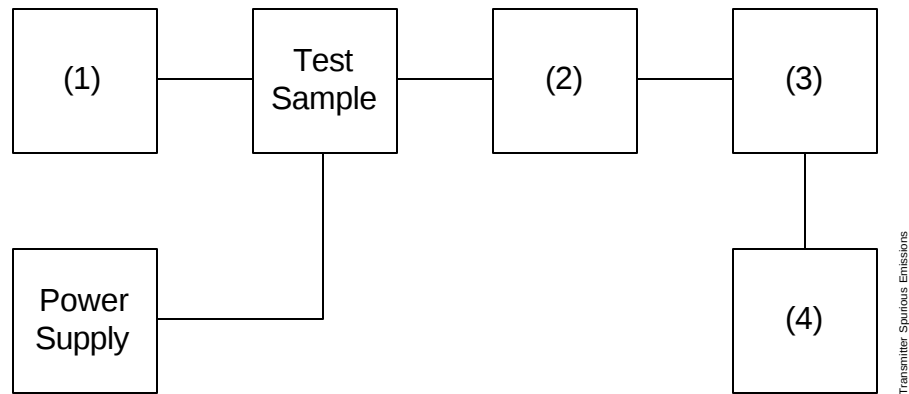
Measurement Procedure

1. The EUT and test equipment were set up as shown on the following page, with the Spectrum Analyzer loosely coupled.
2. The transmit function was enabled.
3. The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.
4. Measurement Results: Attached

Transmitter Spurious Emission

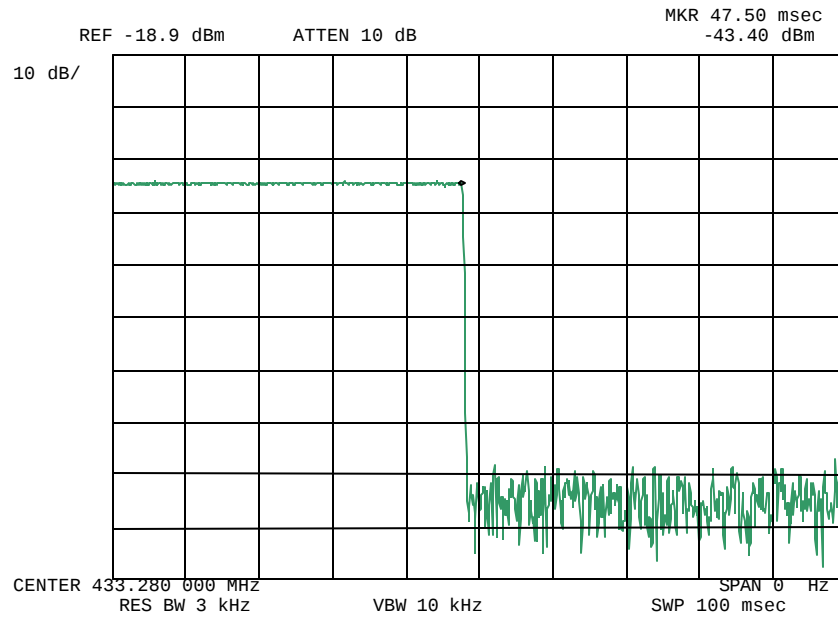
Test A. Occupied Bandwidth (In-Band Spurious)

Test B. Out-of-Band Spurious



Asset	Description	s/n
(1)	Audio Oscillator/Generator	
X	i00017 HP 8903A	2216A01753
(2)	Coaxial Attenuator	
(3)	Filters; Notch, HP, LP, BP (if required)	
(4)	Spectrum Analyzer	
X	i00048 HP 8566B	2511A01467
	i00029 HP 8563E	3213A00104

Name of Test: Occupied Bandwidth
g0520106: 2005-Feb-21 Mon 11:22:00
State: 2:High Power



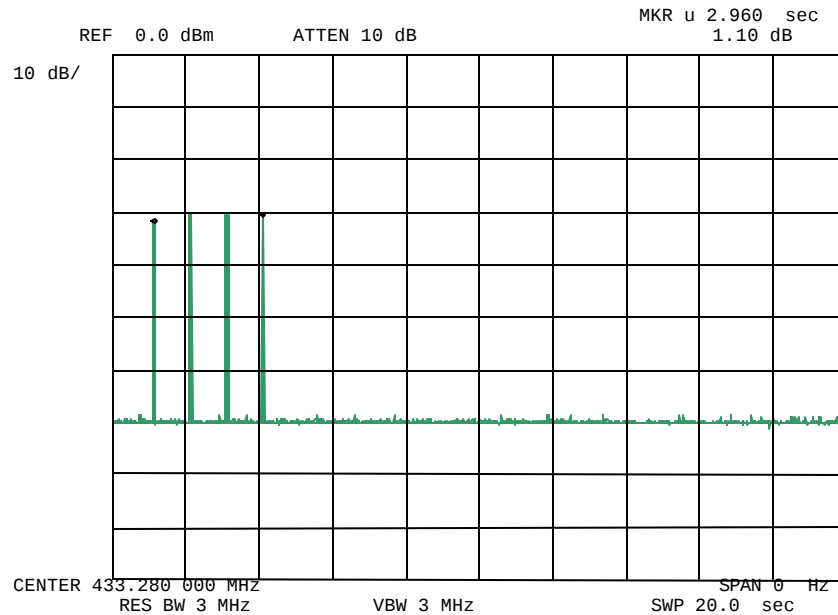
Power:
Modulation:

HIGH
TX PULSE
15.231(a)

Supervised By:

David E. Lee, Quality Assurance Manager

Name of Test: Emission Masks (Occupied Bandwidth)
g0520112: 2005-Feb-21 Mon 12:24:00
State: 2:High Power



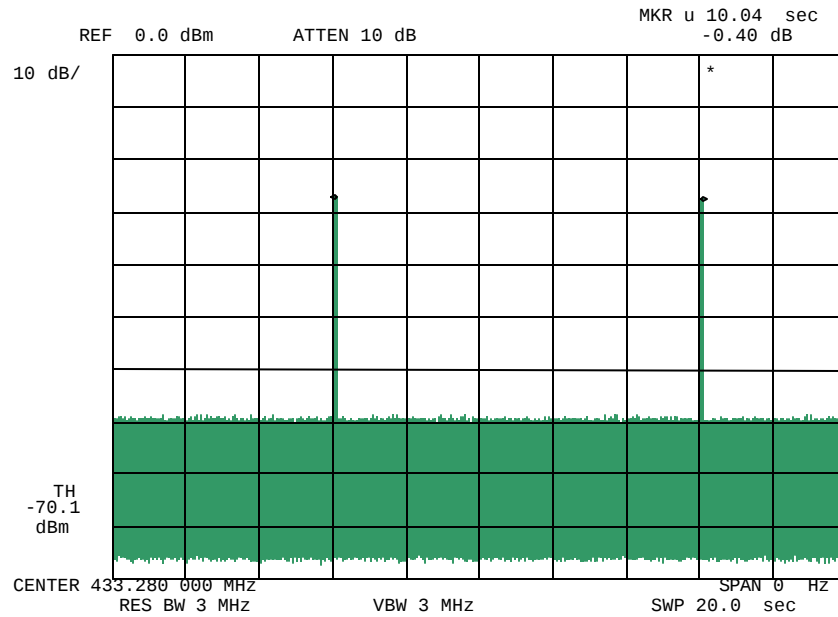
Power:
Modulation:

HIGH
EVENT
(4 pulses of 47mSec, lasting 2.96 Sec)
15.231 (a)

Supervised By:

David E. Lee, Quality Assurance Manager

Name of Test: Emission Masks (Occupied Bandwidth)
g0520110: 2005-Feb-21 Mon 12:13:00
State: 2:High Power



Power:
Modulation:

HIGH
10SEC BETWEEN BURST
15.231 (e)

Supervised By:

David E. Lee, Quality Assurance Manager

Name of Test: Pulsed Operation Calculations

Specification: 47 CFR 15.37(c)

Test Equipment: As per previous page

Measurement Procedure

1. The EUT and test equipment were set up as shown with the Spectrum Analyzer connected.
2. The pulse train and pulse repetition was measured with the Spectrum Analyzer controls set as shown on the test results.
3. Calculations:

Pulse Width, W, seconds	=	2.6 mSec
Pulse Interval, 1, seconds	=	2.1 mSec
De-Rating Factor	=	$20 \log_{10}(w / i)$
	=	1.86dB
4. Measurement Results: Attached

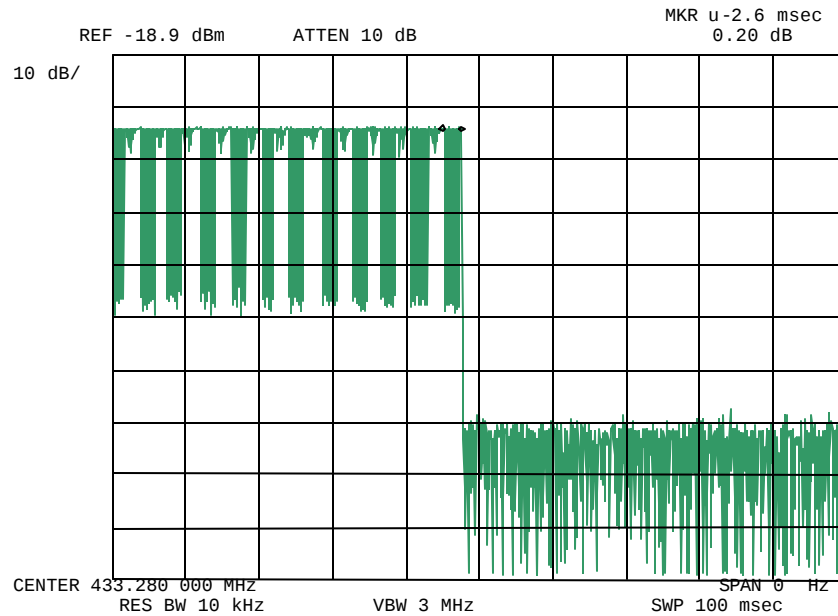
Name of Test: Pulsed Operation Calculations

Measurement Results

g0520107: 2005-Feb-21 Mon 12:01:00

State: 2:High Power

Ambient Temperature: 23°C ± 3°C



Power:
Modulation:

HIGH
PULSE TRAIN
(PULSE WIDTH)

Supervised By:

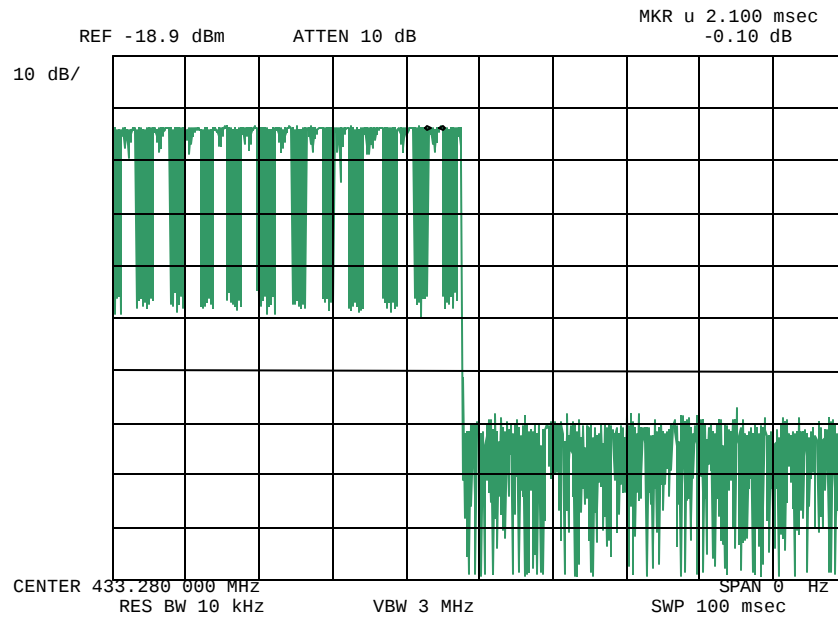
David E. Lee, Quality Assurance Manager

Name of Test: Pulsed Operation Calculations

Name of Test: Emission Masks (Occupied Bandwidth)

g0520108: 2005-Feb-21 Mon 12:03:00

State: 2:High Power



Power:
Modulation:

HIGH
PULSE TRAIN
(INTERVAL)

Supervised By:

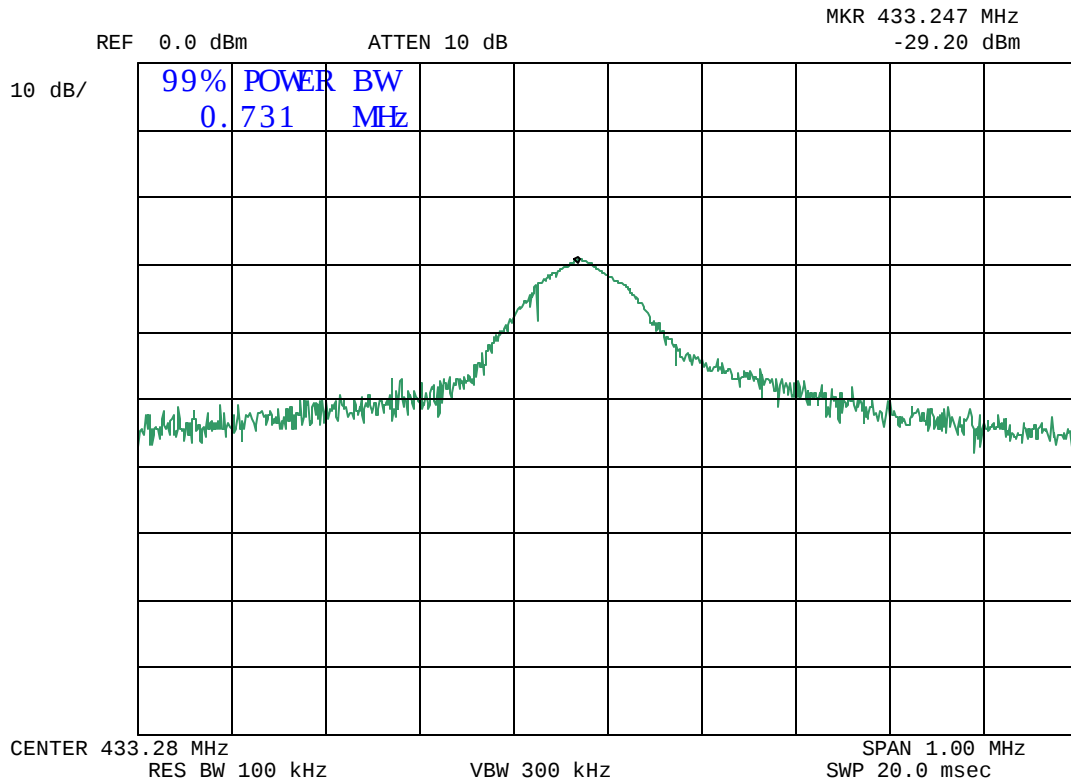
David E. Lee, Quality Assurance Manager

Name of Test: Necessary Bandwidth Calculations

Name Of Test: Emission Masks (Occupied Bandwidth)

g0520113: 2005-Feb-21 Mon 15:24:00

State: 0:General



Power:
Modulation:

99 PERCENT
OOK

Supervised By:

David E. Lee, Quality Assurance Manager

Name of Test: Necessary Bandwidth and Emission Bandwidth

Specification: 47 CFR 2.202(g)

Modulation = OOK

Necessary Bandwidth Calculation:

Measured at 99% Power Bandwidth. kHz = 731.0



Supervised By:

David E. Lee, Quality Assurance Manager

Radiated Measurements For Part 15 Transmitters W/ Integral Antennas

Radiated Measurements

Range Of Measurement	Specification	Resolution B/W	Video B/A
30 to 1000 MHz	CISPR	≥ 100 kHz	≥ 100 kHz
>1000 MHz	FCC, 15.37(b)	1 MHz	≥ 1 MHz
(if averaging)	FCC, 15.37(b)	1 MHz	10 Hz

Measuring Equipment

a. Antennas:

EMCO 3109	20 - 300 MHz
APREL AALP2001	200 - 1000 MHz
APREL AAB20200	20 - 200 MHz
APREL AAH118	1 - 18 GHz

b. Instruments:

HP8566B	Spectrum Analyzer
HP85685A	Preselector, w/ preamp below 2 GHz
HP85650A	Quasi Peak Adapter
HP8449	Preamp, above 2 GHz

Occupied Bandwidth

Occupied Bandwidth is measured as a radiated signal without attenuators and/or filter. RBW, VBW and scan settings as shown were set to produce a meaningful result in accordance with ANSI C63.4, Section 13.1.7.

Part 15.21, Information to User

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly avoided by the party responsible for compliance could void the user's authority to operate the equipment.

§ 15.205 Restricted Bands of Operation

(a) Except as shown in paragraph (b) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69625	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-339.4	3600-4400	
13.36-13.41			

**Testimonial
And
Statement Of Certification**

This is to certify that:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
2. **That** the technical data supplied with the application was taken under my direction and supervision.
3. **That** the data was obtained on representative units, randomly selected.
4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.



Certifying Engineer:

David E. Lee, Quality Assurance Manager