



**Nemko Test Report:** 2024RUS1

**Applicant:**  
Cadco Systems  
2363 Merritt Drive  
Garland, TX 75041  
USA

**Equipment Under Test:** Dia-Track Truck Diagnostics and Tracking System  
**(E.U.T.)**

**In Accordance With:** **FCC Part 15, Subpart C, 15.247**  
Frequency Hopping Transmitters

**Tested By:** Nemko USA Inc.  
802 N. Kealy  
Lewisville, Texas 75057-3136

**TESTED BY:**   
\_\_\_\_\_  
Kevin Rose, Senior Wireless Engineer

**DATE:** 17 January 2007

**APPROVED BY:**   
\_\_\_\_\_  
David Light, Senior Wireless Engineer

**DATE:** 17 January 2007

**Total Number of Pages:** 40

## Table of Contents

<b>SECTION 1. SUMMARY OF TEST RESULTS</b>	<b>3</b>
<b>SECTION 2. EQUIPMENT UNDER TEST (E.U.T.)</b>	<b>5</b>
<b>SECTION 3. CHANNEL SEPARATION</b>	<b>7</b>
<b>SECTION 4. TIME OF OCCUPANCY</b>	<b>12</b>
<b>SECTION 5. PEAK POWER OUTPUT</b>	<b>17</b>
<b>SECTION 6. SPURIOUS EMISSIONS (ANTENNA CONDUCTED)</b>	<b>18</b>
<b>SECTION 7. SPURIOUS EMISSIONS (RADIATED)</b>	<b>24</b>
<b>SECTION 8. TEST EQUIPMENT LIST</b>	<b>28</b>
<b>ANNEX A - TEST DETAILS</b>	<b>29</b>
<b>ANNEX B - TEST DIAGRAMS</b>	<b>38</b>

**Section 1. Summary of Test Results**

Manufacturer: Cadco Systems

Part No.: 413-0002-000revA

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 for Frequency Hopping Spread Spectrum devices. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site.

A description of the test facility is on file with the FCC.

<input checked="" type="checkbox"/>	New Submission	<input type="checkbox"/>	Production Unit
<input type="checkbox"/>	Class II Permissive Change	<input checked="" type="checkbox"/>	Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".



Nemko USA Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko USA Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This report applies only to the items tested.

**Summary Of Test Data**

NAME OF TEST	PARA. NO.	RESULT
Powerline Conducted Emissions	15.207(a)	NA
Channel Separation	15.247(a)(1)	Complies
Time of Occupancy	15.247(a)(1)	Complies
20 dB Occupied Bandwidth	15.247(a)(1)	Complies
Peak Power Output	15.247(b)	Complies
Spurious Emissions (Antenna Conducted)	15.247(d)	Complies
Spurious Emissions (Radiated)	15.247(d)	Complies

**Footnotes:**

The device is not powered via AC mains.

**Section 2. Equipment Under Test (E.U.T.)****General Equipment Information**

**Frequency Band:**  902 – 928 MHz  
 2400 – 2483.5 MHz  
 5725 – 5850 MHz

**Operating Frequency Range:** 902.5-927.0 MHz

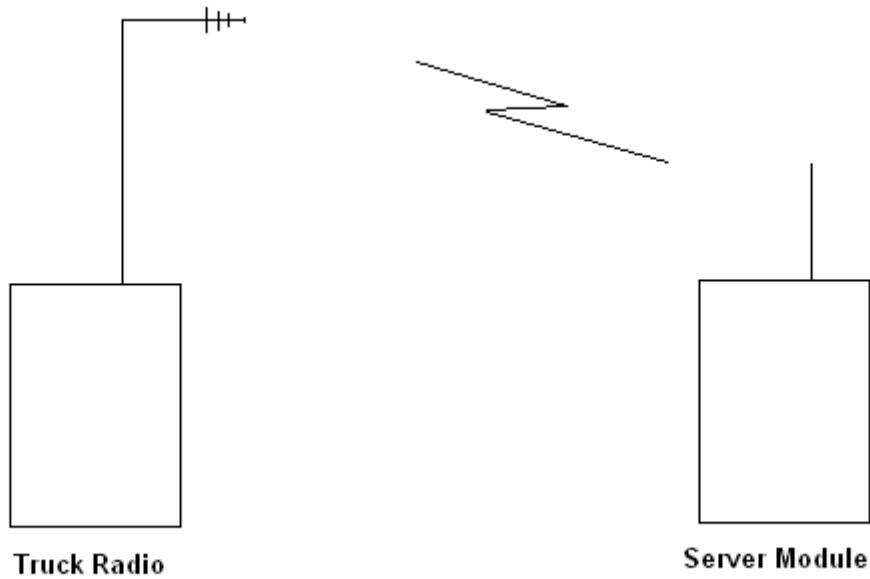
**Number of Channels:** 50

**Channel Spacing:** 500 kHz

**User Frequency Adjustment:** Software controlled

**Description of EUT**

The Dia-Track Truck Diagnostics and Tracking System is composed of a Truck Radio Module and a Server Radio Module. The Server Radio Module will be located in a truck stop and the Truck Radio Module will be located inside a truck.

**System Diagram**

**Section 3. Channel Separation**

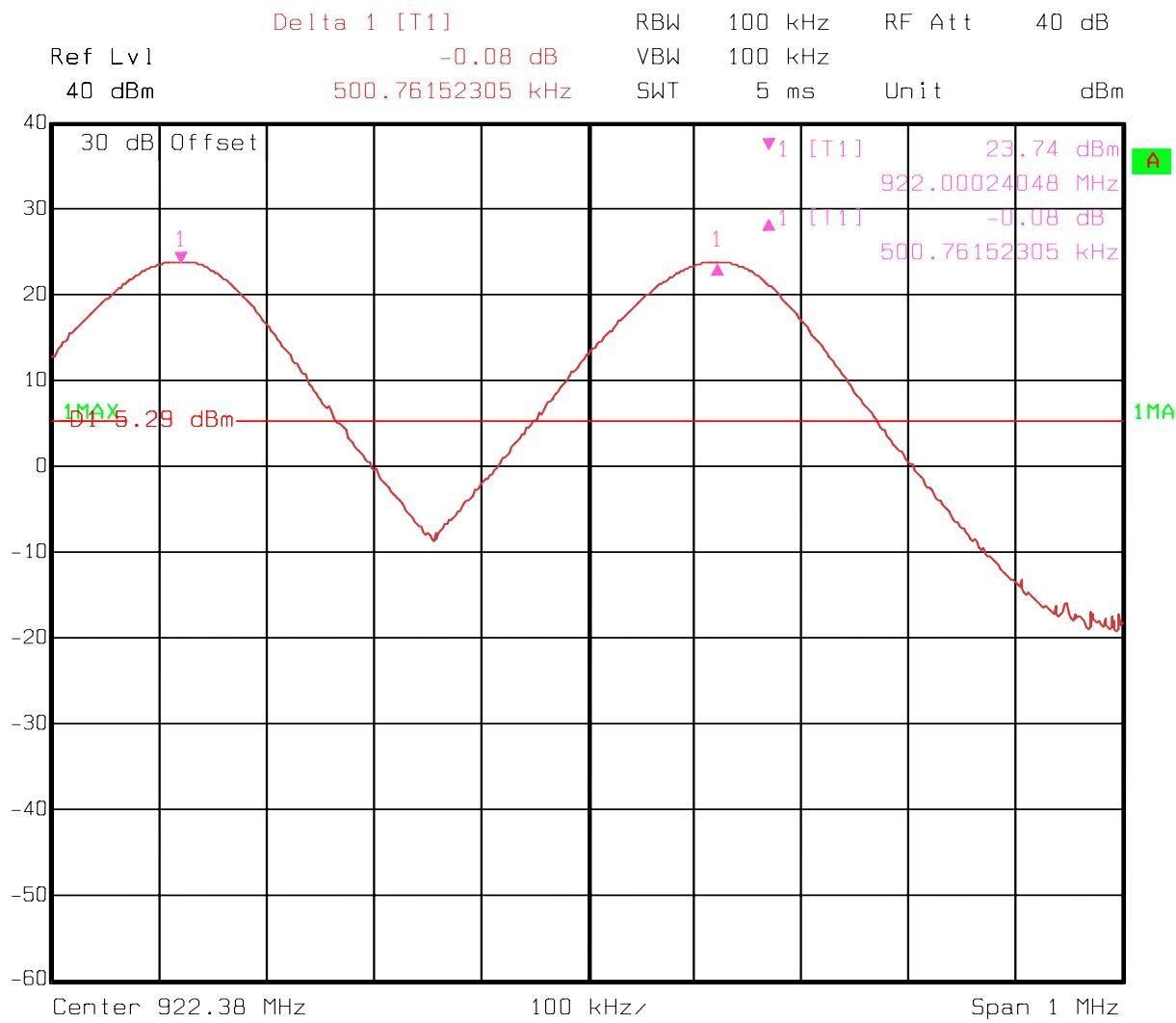
NAME OF TEST: Channel Separation	PARA. NO.: 15.247(a)(1)
TESTED BY: Kevin Rose	DATE: 12 January 2007

**Test Results:** Complies.**Measurement Data:** See 20 dB BW plot

Measured 20 dB bandwidth: 332 kHz  
Channel Separation: 500 kHz

**Equipment Used:** 1036-1478-1479-1629**Measurement Uncertainty:**  $1 \times 10^{-7}$  ppm**Temperature:** 22°C**Relative Humidity:** 49%

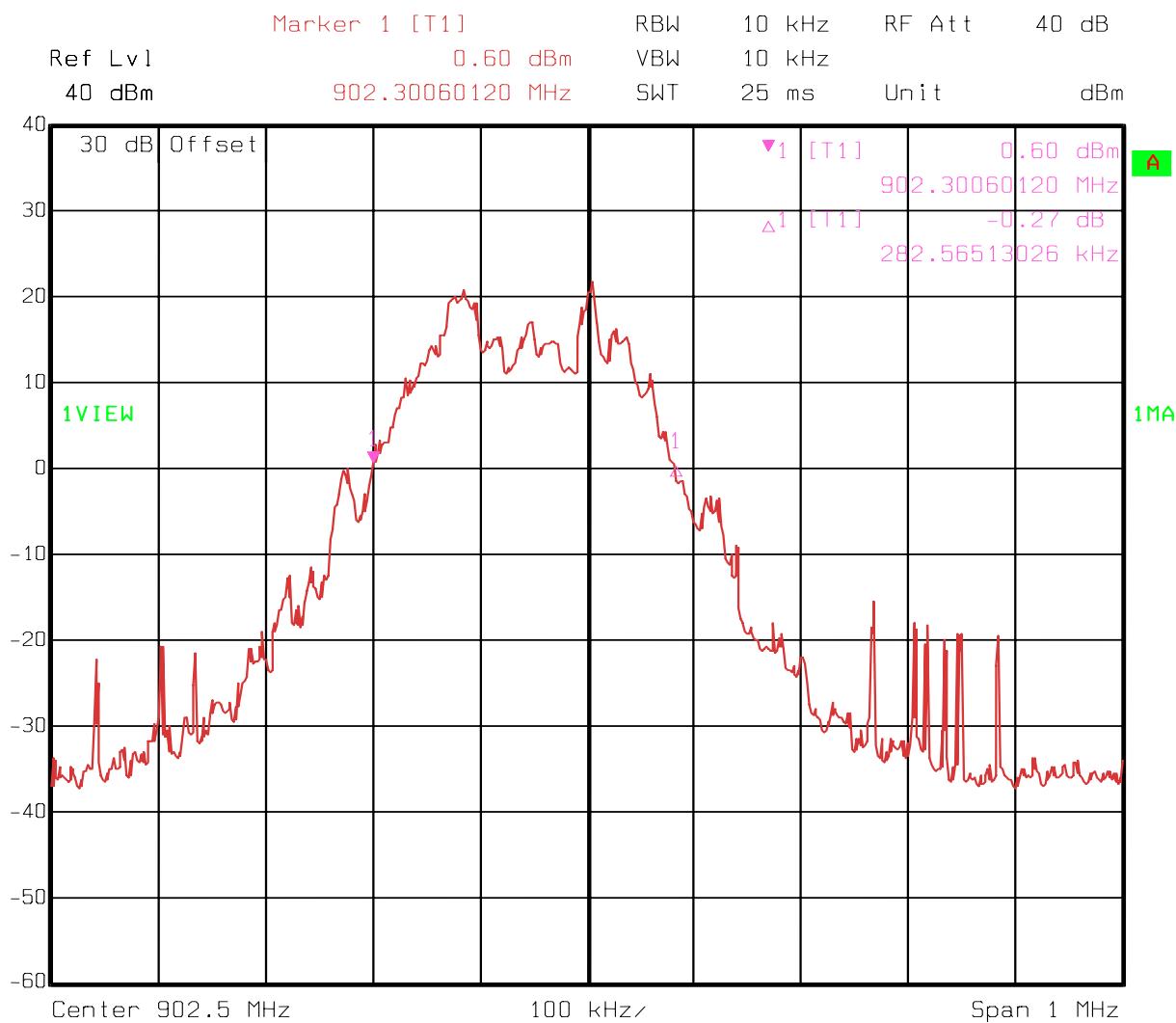
## Test Data – Channel Separation



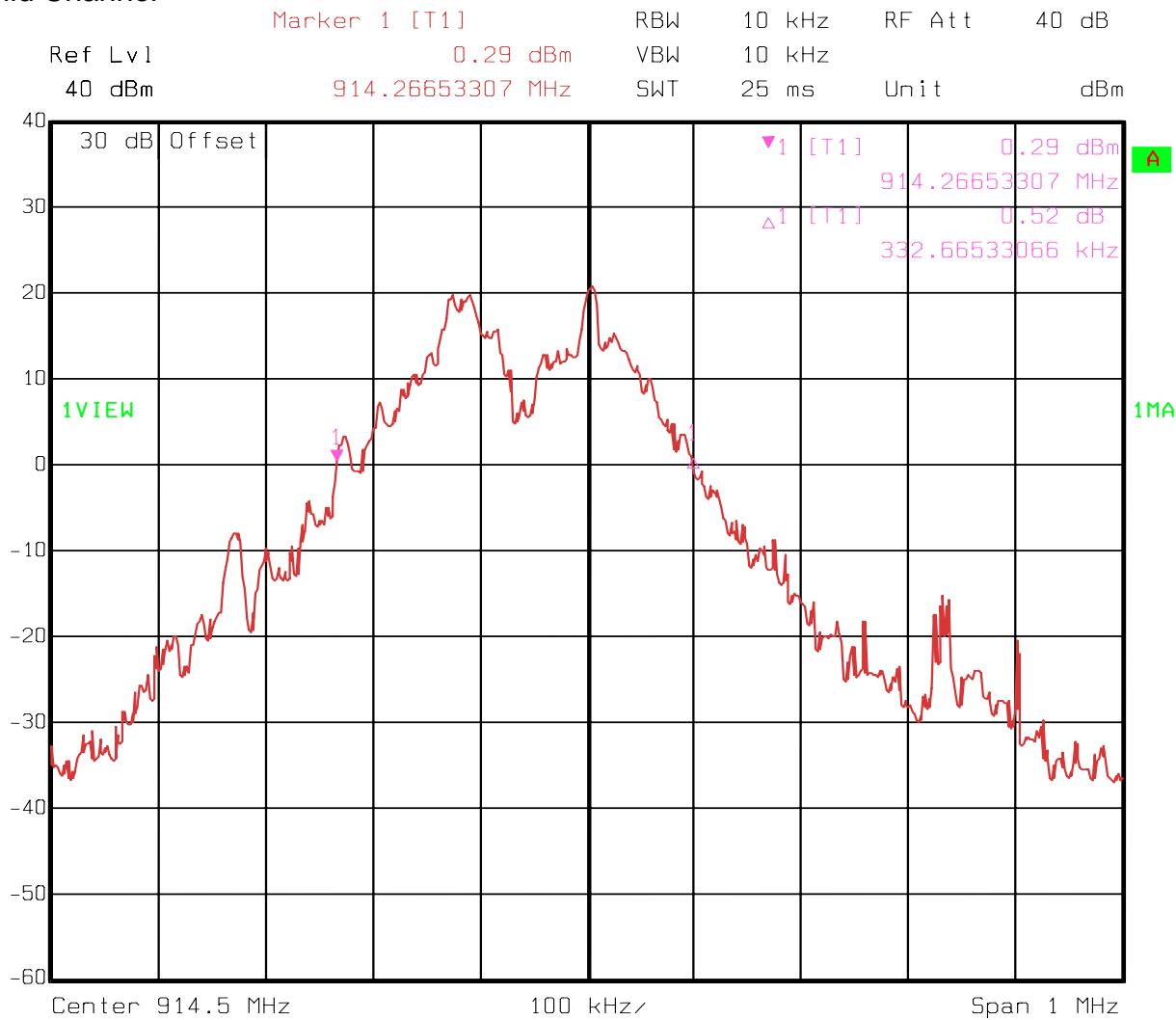
Date: 12.JAN.2007 10:58:16

## Test Data – 20 dB Bandwidth

## Low Channel



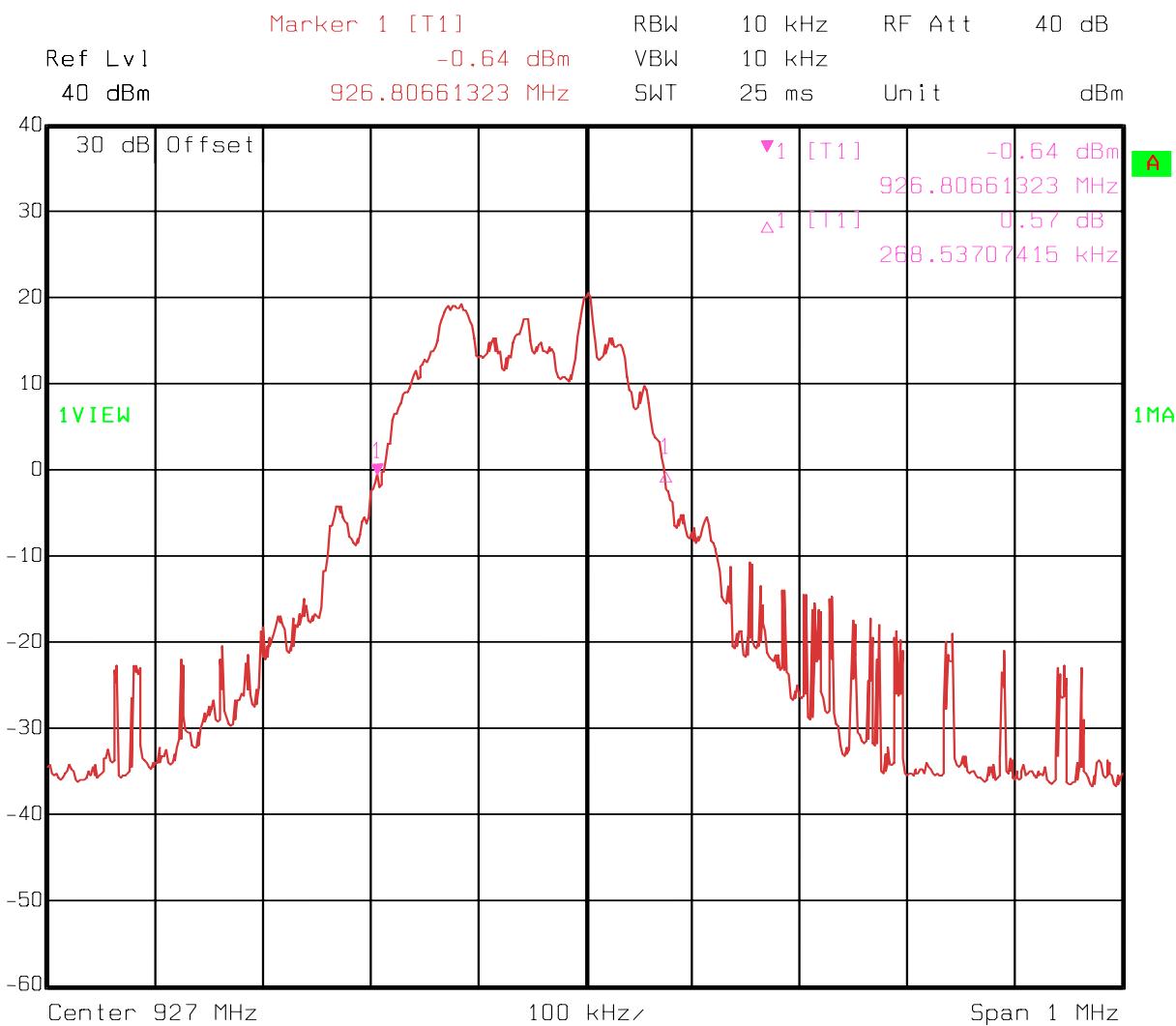
Date: 12.JAN.2007 11:44:09

**Test Data – 20 dB Bandwidth****Mid Channel**

Date: 12.JAN.2007 11:42:32

**Test Data – 20 dB Bandwidth**

High Channel



Date: 12.JAN.2007 11:39:27

**Section 4. Time of Occupancy**

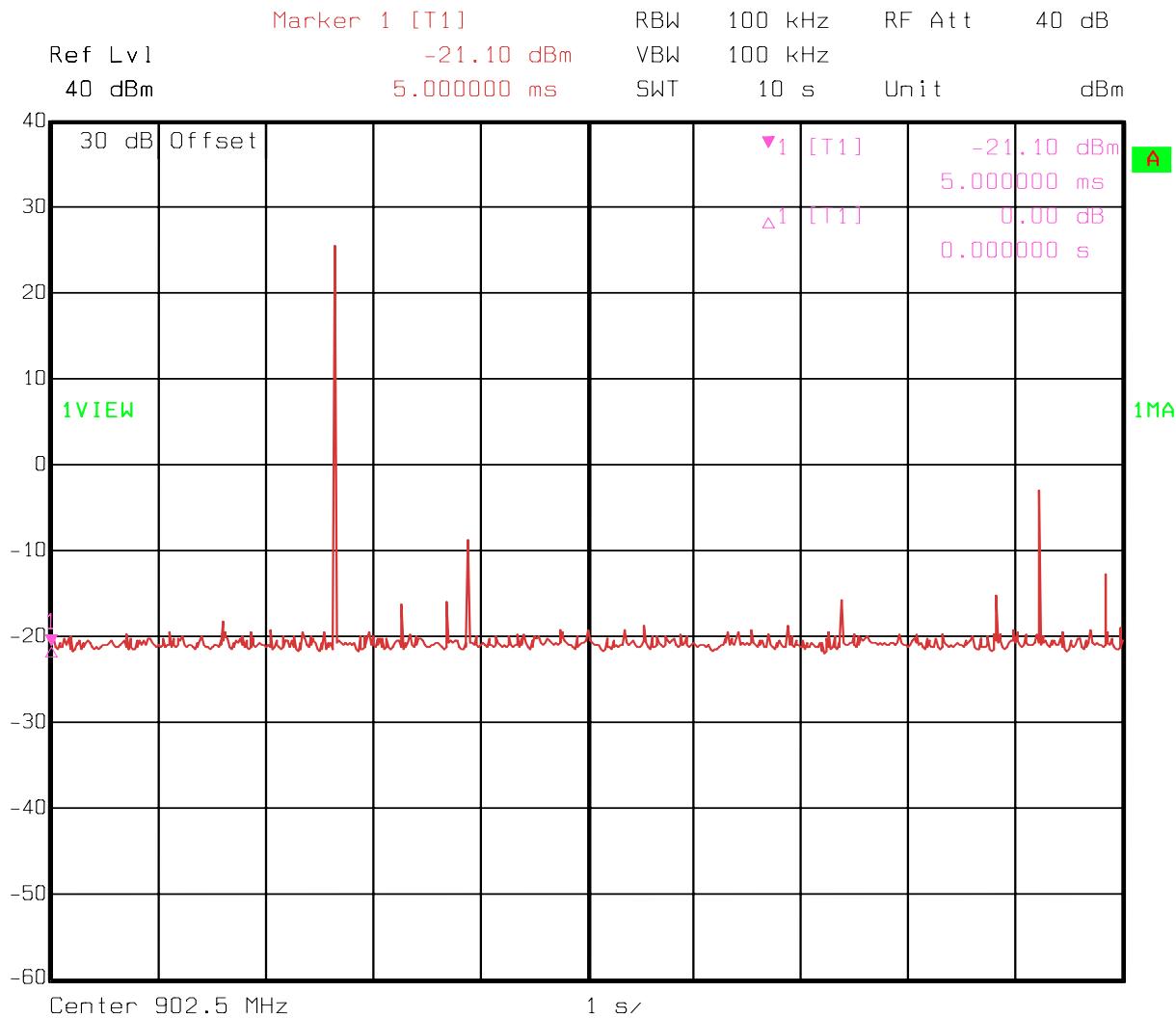
NAME OF TEST: Time of Occupancy	PARA. NO.: 15.247(a)(1)
TESTED BY: Kevin Rose	DATE: 12 January 2007

**Test Results:** Complies.**Measurement Data:**

Maximum Dwell Time On Any Channel:

**Equipment Used:** 1036-1478-1479-1629**Measurement Uncertainty:** 1X10<sup>-7</sup>ppm**Temperature:** 22 °C**Relative Humidity:** 45 %

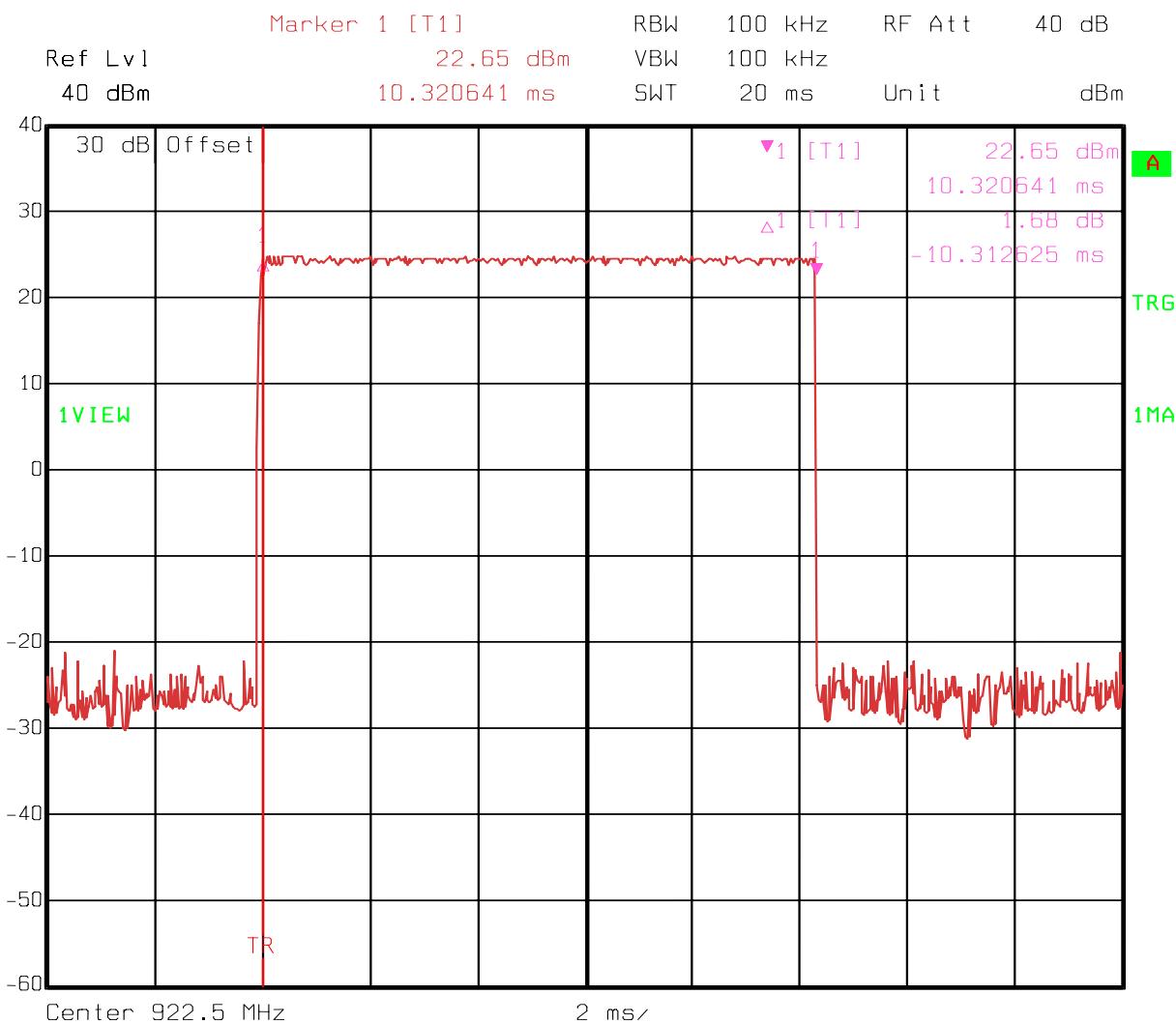
## Test Data – Time of Occupancy



Date: 12.JAN.2007 11:46:20  
10.4 mS in 10 seconds

**Test Data – Time of Occupancy**

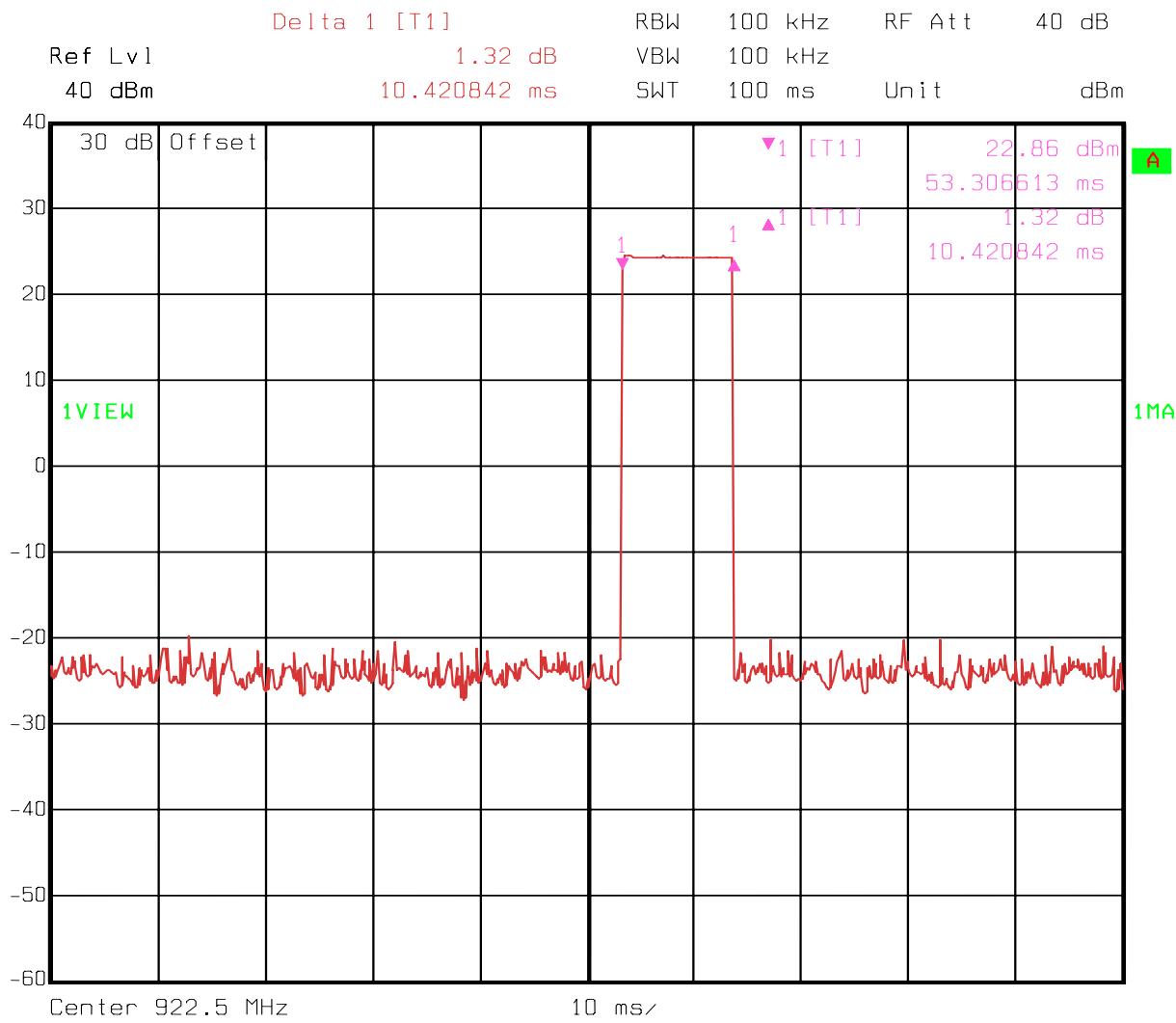
## Pulse Width



**Test Data – Time of Occupancy**

Transmit time in 100 mS (For duty cycle calculation)

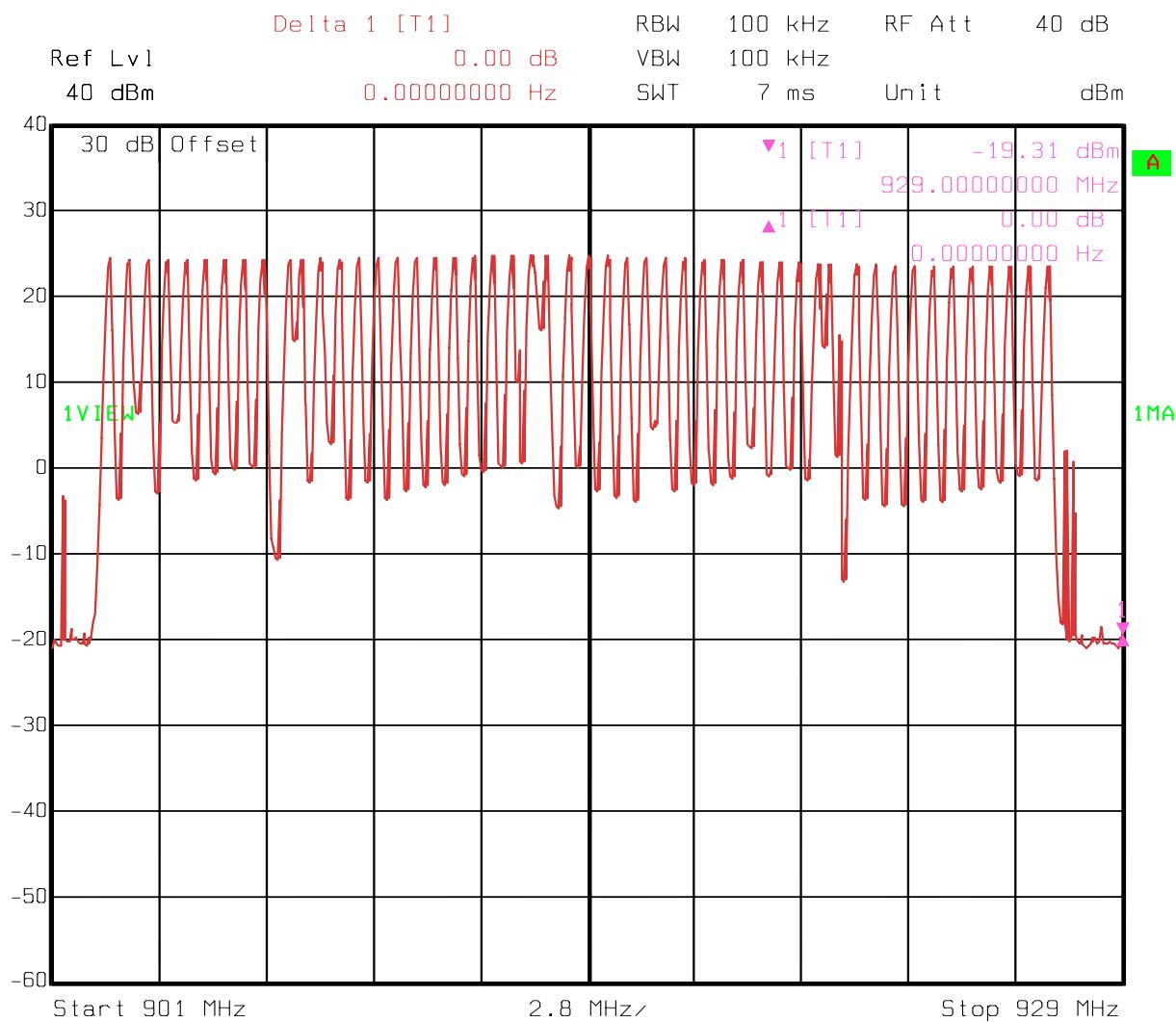
$$20 \log (10.4/100) = -19.64 \text{ db duty cycle}$$



Date: 12.JAN.2007 11:05:17

**Test Data – Time of Occupancy**

Number of hopping channels = 50



**Section 5. Peak Power Output**

NAME OF TEST: Peak Power Output	PARA. NO.: 15.247 (b)
TESTED BY: Kevin Rose	DATE: Jan 17 2007

**Test Results:** Complies.**Measurement Data:** See attached plots.Detachable antenna?  Yes  No

If yes, state the type of non-standard connector used:

Professionally installed

Frequency (MHz)	Peak Power (dBm)	Peak Power (W)	Antenna Type	Gain (dBi)	E.I.R.P. (dBm)	E.I.R.P. (W)
902.5	29.1	0.813	Monopole	6	35.9	3.89
914.5	29.1	0.813	Monopole	6	35.9	3.89
927	28.4	0.692	Monopole	6	34.4	2.754
Maximum EIRP (W): 3.89						

- This device was tested at +/- 15% input power per 15.31(e), with no variation in output power.
- For battery powered equipment, the device was tested with a fresh battery per 15.31(e).
- The device was tested on three channels per 15.31(l).
- This test was performed radiated.

**Equipment Used:** 1036-1478-1479-1629**Measurement Uncertainty:** 1.7 dB**Temperature:** 22 °C**Relative Humidity:** 45 %

**Section 6. Spurious Emissions (Antenna Conducted)**

NAME OF TEST: Spurious Emissions (Antenna Conducted)	PARA. NO.: 15.247(d)
TESTED BY: Kevin Rose	DATE: 17 January 07

**Test Results:** Complies.

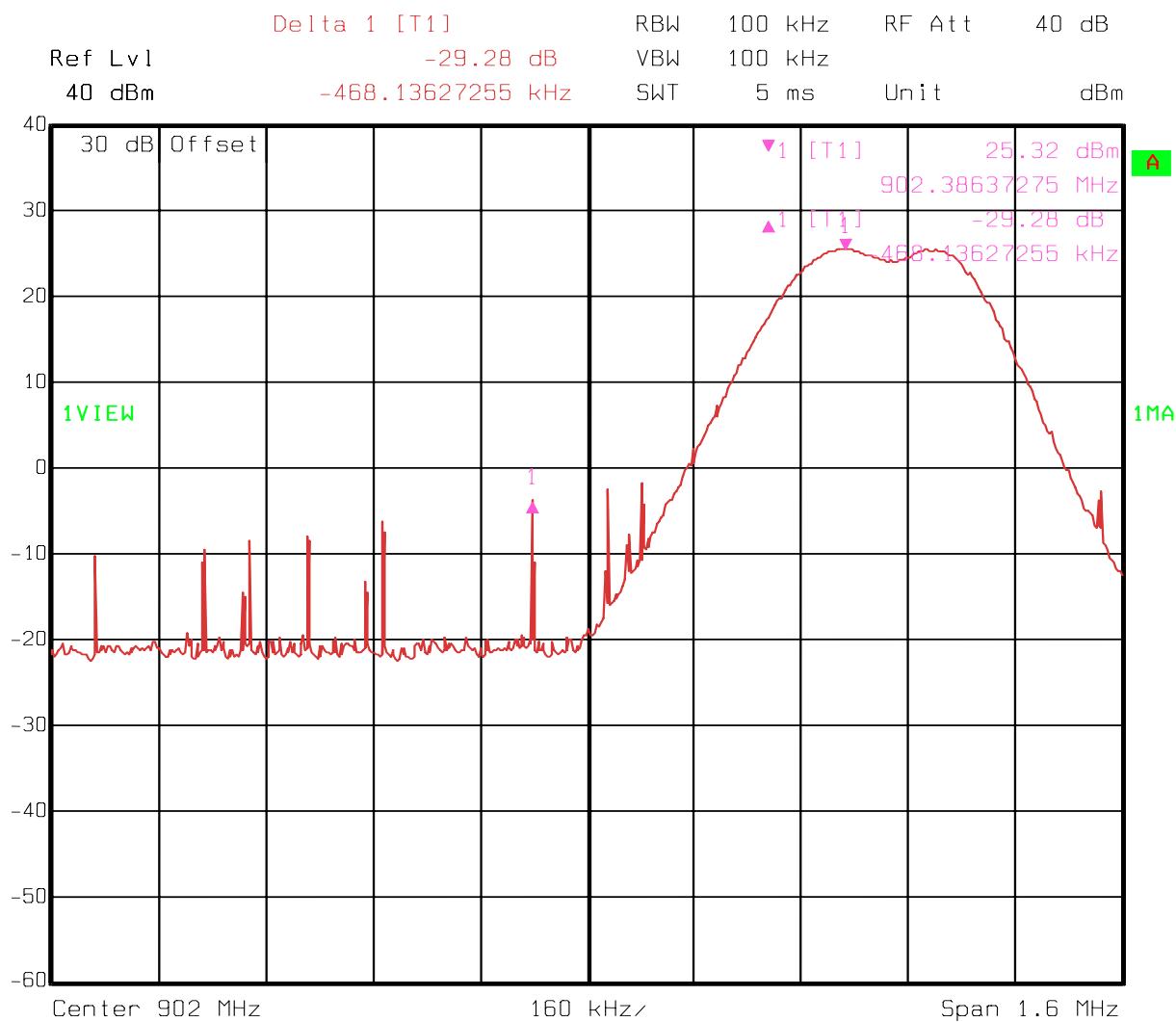
**Measurement Data:** See attached plots.

**Equipment Used:** 1036-1478-1469-1629

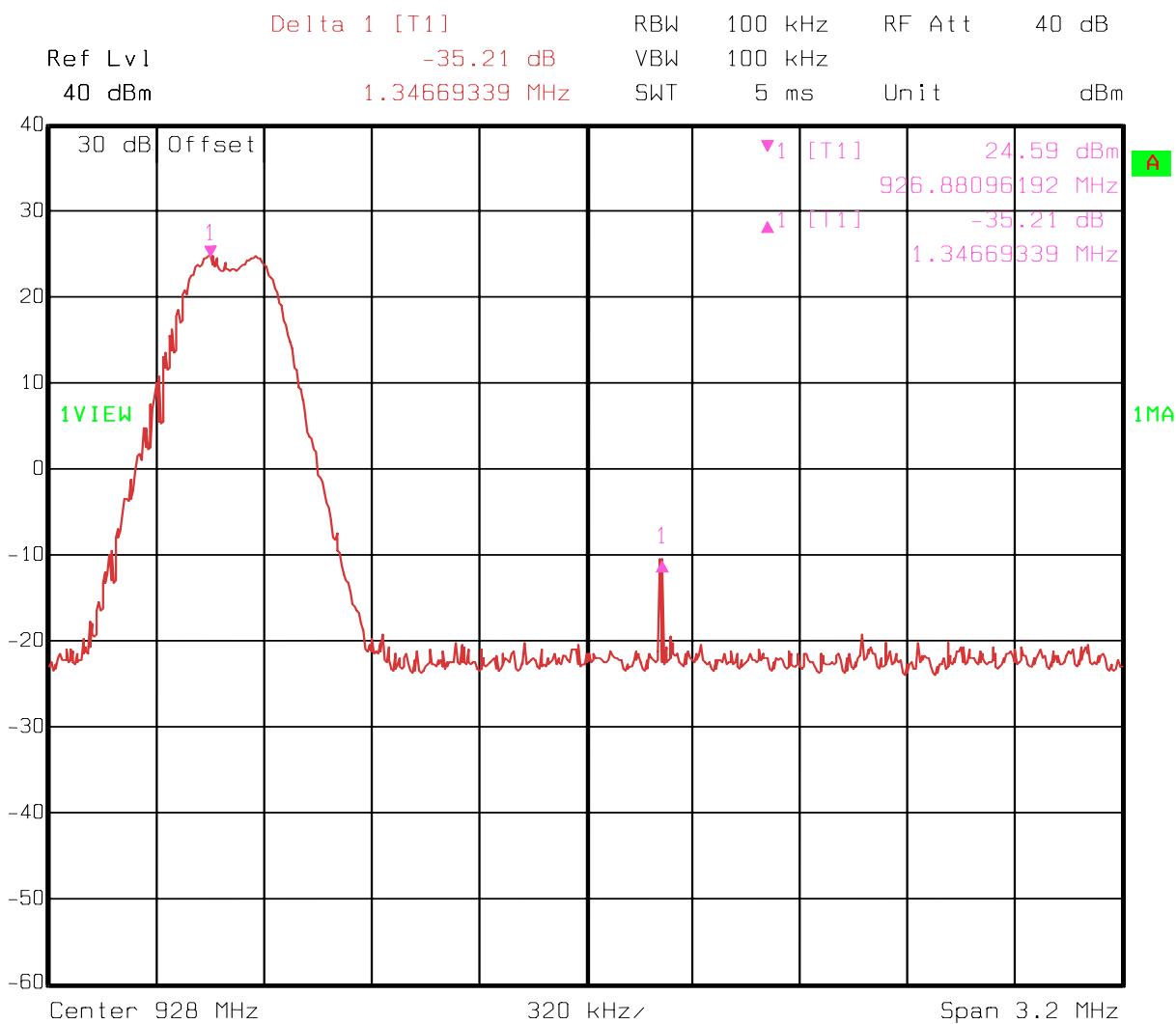
**Measurement Uncertainty:** 1X10<sup>-7</sup>ppm

**Temperature:** 22 °C

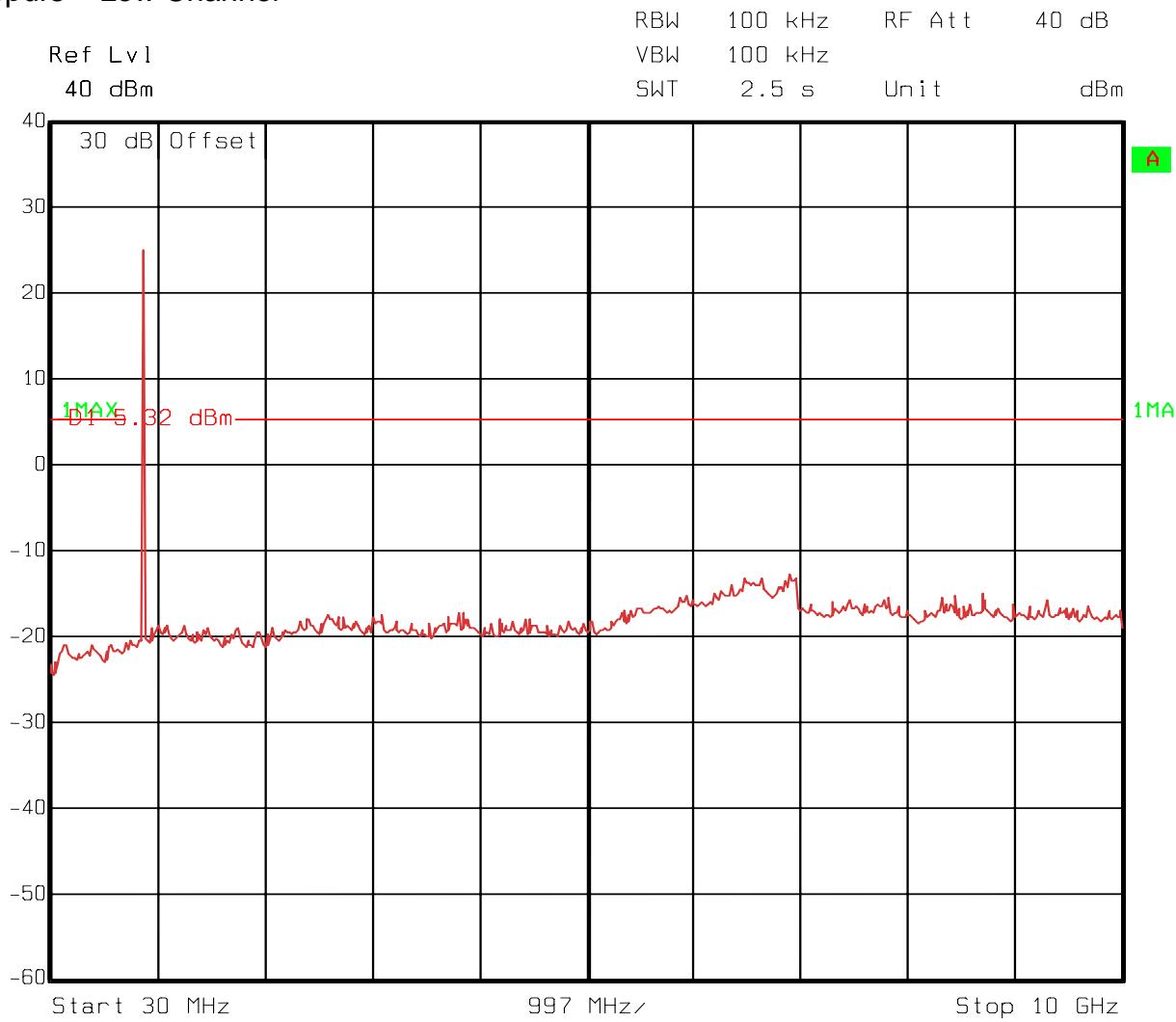
**Relative Humidity:** 45 %

**Test Data – Spurious Emissions at Antenna Terminals****Lower Band Edge**

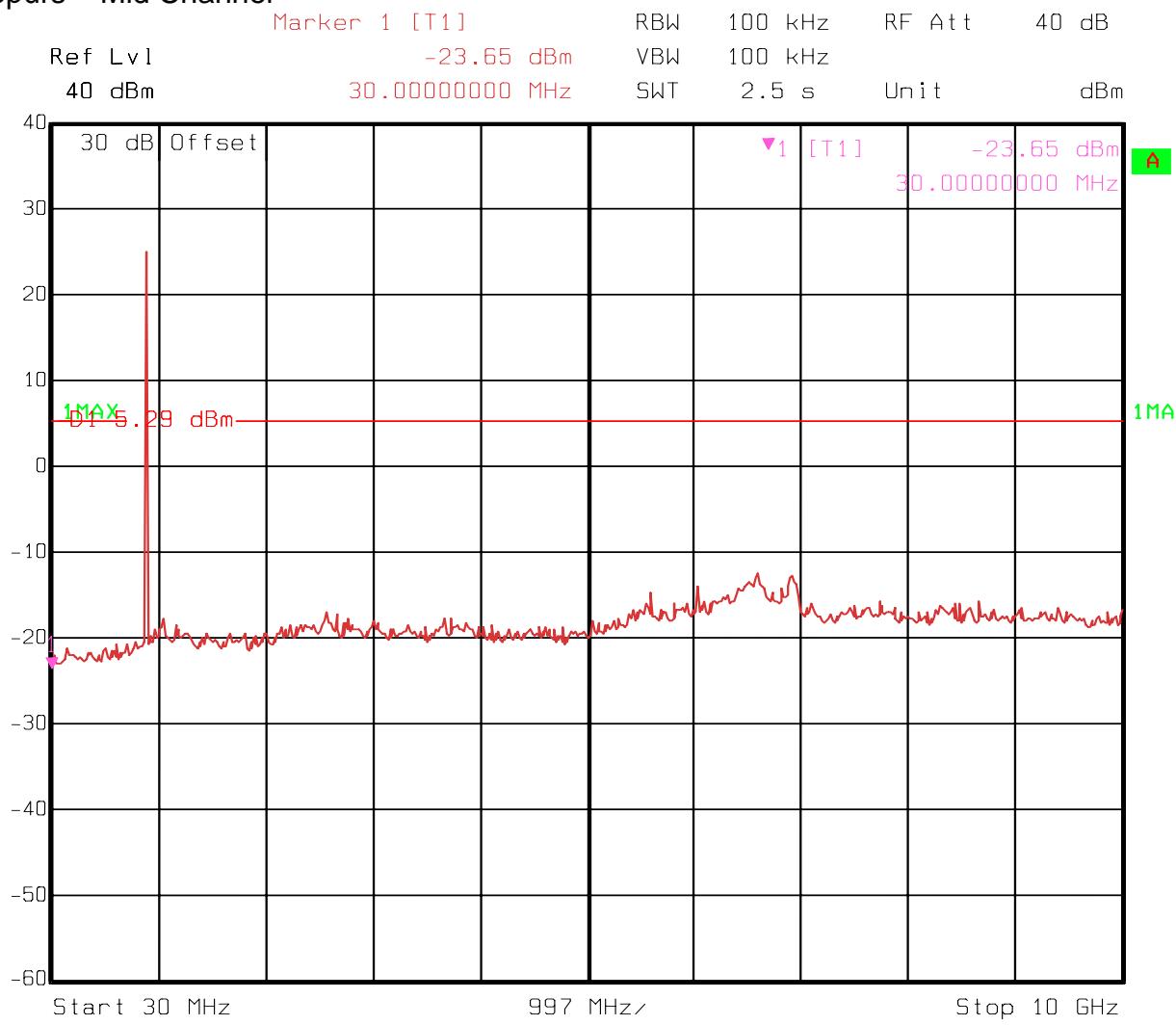
Date: 12.JAN.2007 10:23:41

**Test Data – Spurious Emissions at Antenna Terminals****Upper Band Edge**

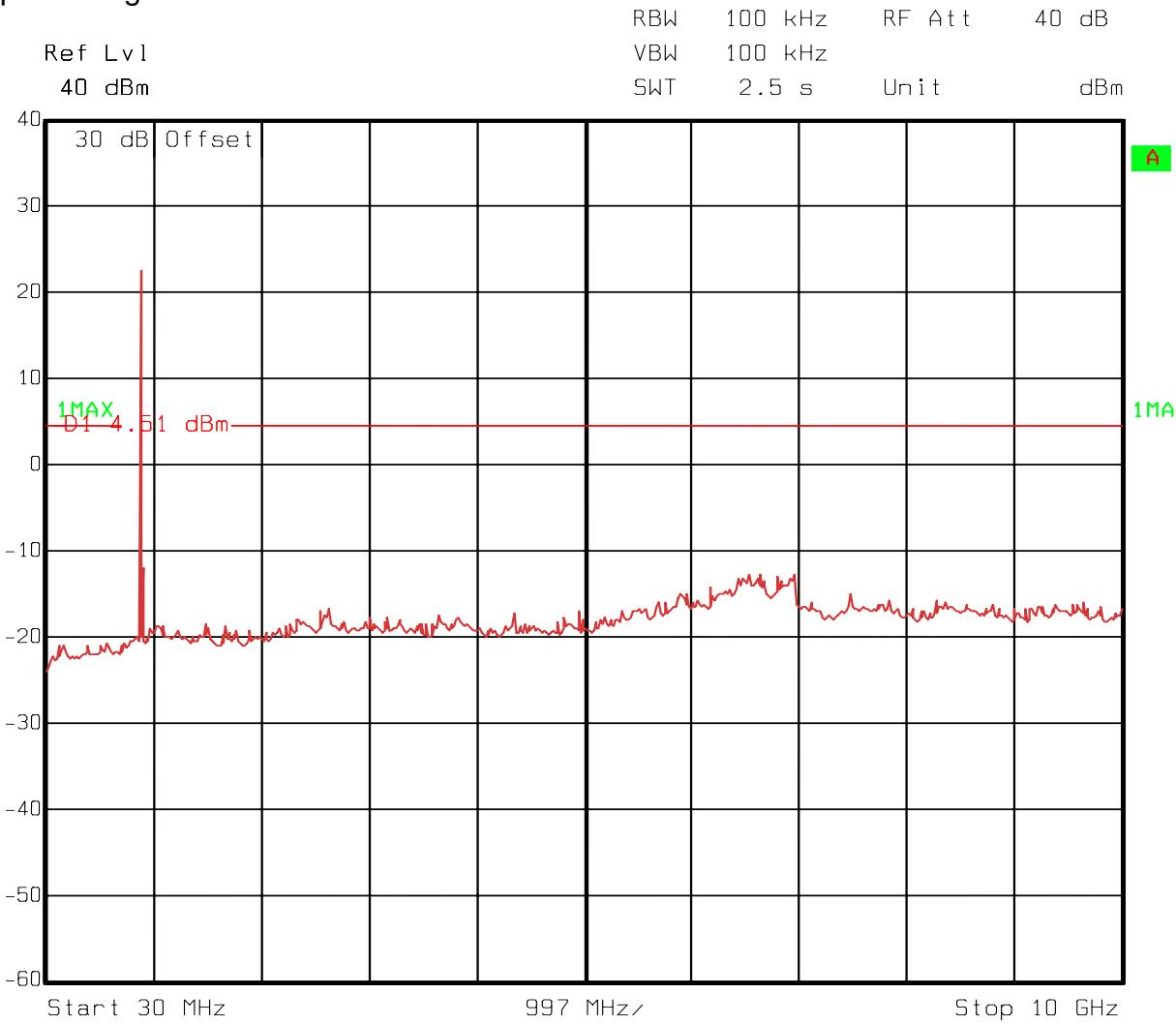
Date: 12.JAN.2007 10:26:39

**Test Data – Spurious Emissions at Antenna Terminals****Spurs – Low Channel**

Date: 12.JAN.2007 10:40:19

**Test Data – Spurious Emissions at Antenna Terminals****Spurs – Mid Channel**

Date: 12.JAN.2007 10:43:05

**Test Data – Spurious Emissions at Antenna Terminals****Spurs – High Channel**

Date: 12.JAN.2007 10:36:57

**Section 7. Spurious Emissions (Radiated)**

NAME OF TEST: Spurious Emissions (Radiated)	PARA. NO.: 15.247(d)
TESTED BY: Kevin Rose	DATE: 14 January 2007

**Test Results:** Complies. The worst case emission was dB $\mu$ V/m at MHz. This is dB below the specification limit of dB $\mu$ V/m.

**Measurement Data:** See attached table.

**Duty Cycle Calculation:**

Duty Cycle correction factor(dB) =  $20 \log (rf_{ON} \text{ in ms}/100\text{ms})$

**Notes:**

- For handheld devices, the EUT was tested on three orthogonal axis'
- The device was tested from 30 MHz to the tenth harmonic of the highest fundamental frequency per 15.33
- The device was tested on three channels per 15.31(l).
- No emissions were detected within 20 dB of the specification limit therefore none are reported per 15.31(o). Band edge data is presented below.

**Equipment Used:** 1464-1484-1485-1016-993-759-1195-791

**Measurement Uncertainty:**  +/-3.6 dB

**Temperature:** 20 °C

**Relative Humidity:** 32 %

## Test Data - Radiated Emissions

Measurement Data:		Reading listed by order taken.					Test Distance: 3 Meters				
#	Freq MHz	Rdng dB $\mu$ V	Cable dB	Cable dB	Pre-A Duty dB	Horn dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
1	1805.167 Peak	58.7	+0.7	+2.0	-32.0	+27.0	+0.0	56.4	74.0	-17.6	Vert
2	2707.667 Peak	69.3	+0.8	+2.8	-32.7	+29.3	+0.0	69.5	74.0	-4.5	Vert
3	2707.667 Ave	69.3	+0.8	+2.8	-32.7	+29.3	+0.0	50.0	54.0	-4.0	Vert
4	3610.167 Peak	66.0	+0.8	+2.8	-32.4	+30.3	+0.0	67.5	74.0	-6.5	Vert
5	3610.167 Ave	66.0	+0.8	+2.8	-32.4	+30.3	+0.0	48.0	54.0	-6.0	Vert
6	4512.667 Peak	53.2	+1.0	+3.1	-31.6	+32.0	+0.0	57.7	74.0	-16.3	Vert
7	4512.667 Ave	53.2	+1.0	+3.1	-31.6	+32.0	+0.0	38.2	54.0	-15.8	Vert
8	5415.167 Peak	47.5	+1.2	+3.5	-31.9	+33.6	+0.0	53.9	74.0	-20.1	Vert
9	5415.167 Ave	47.5	+1.2	+3.5	-31.9	+33.6	+0.0	34.4	54.0	-19.6	Vert
10	5415.167 Peak	43.5	+1.2	+3.5	-31.9	+33.6	+0.0	49.9	54.0	-4.1	Horiz
11	4512.667 Peak	46.2	+1.0	+3.1	-31.6	+32.0	+0.0	50.7	54.0	-3.3	Horiz
12	3610.167 Peak	57.3	+0.8	+2.8	-32.4	+30.3	+0.0	58.8	74.0	-15.2	Horiz
13	3610.167 Ave	57.3	+0.8	+2.8	-32.4	+30.3	+0.0	39.3	54.0	-14.7	Horiz
14	2707.667 Peak	61.8	+0.8	+2.8	-32.7	+29.3	+0.0	62.0	74.0	-12.0	Horiz
15	2707.667 Ave	61.8	+0.8	+2.8	-32.7	+29.3	+0.0	42.5	54.0	-11.5	Horiz
16	2743.667 Peak	60.5	+0.8	+2.9	-32.7	+29.4	+0.0	60.9	74.0	-13.1	Horiz
17	2743.667 Ave	60.5	+0.8	+2.9	-32.7	+29.4	+0.0	41.4	54.0	-12.6	Horiz
18	3658.167 Peak	54.3	+0.8	+2.8	-32.3	+30.5	+0.0	56.1	74.0	-17.9	Horiz
19	3658.167 Ave	54.3	+0.8	+2.8	-32.3	+30.5	+0.0	36.6	54.0	-17.4	Horiz
20	4572.667 Peak	47.7	+1.0	+3.1	-31.8	+32.3	+0.0	52.3	54.0	-1.7	Horiz

**Test Data - Radiated Emissions**

#	Freq MHz	Rdng dB $\mu$ V	dB	dB	Duty dB	dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	Polar Ant
21	5487.167	43.7	+1.2	+3.5	-31.9	+33.6	+0.0	50.1	54.0	-3.9	Vert
	Peak										
22	4572.667	55.5	+1.0	+3.1	-31.8	+32.3	+0.0	60.1	74.0	-13.9	Vert
	Peak										
23	4572.667	55.5	+1.0	+3.1	-31.8	+32.3	+0.0	40.6	54.0	-13.4	Vert
	Ave				-19.5						
24	3658.167	63.8	+0.8	+2.8	-32.3	+30.5	+0.0	65.6	74.0	-8.4	Vert
	Peak										
25	3658.167	63.8	+0.8	+2.8	-32.3	+30.5	+0.0	46.1	54.0	-7.9	Vert
	Ave				-19.5						
26	2743.667	65.7	+0.8	+2.9	-32.7	+29.4	+0.0	66.1	74.0	-7.9	Vert
	Peak										
27	2743.667	65.7	+0.8	+2.9	-32.7	+29.4	+0.0	46.6	54.0	-7.4	Vert
	Ave				-19.5						
28	2781.167	64.0	+0.8	+2.9	-32.7	+29.4	+0.0	64.4	74.0	-9.6	Vert
	Peak										
29	2781.167	64.0	+0.8	+2.9	-32.7	+29.4	+0.0	44.9	54.0	-9.1	Vert
	Ave				-19.5						
30	3708.167	62.7	+0.8	+2.8	-32.2	+30.6	+0.0	64.7	74.0	-9.3	Vert
	Peak										
31	3708.167	62.7	+0.8	+2.8	-32.2	+30.6	+0.0	45.2	54.0	-8.8	Vert
	Ave				-19.5						
32	4635.167	52.8	+1.0	+3.2	-32.0	+32.5	+0.0	57.5	74.0	-16.5	Vert
	Peak										
33	4635.167	52.8	+1.0	+3.2	-32.0	+32.5	+0.0	38.0	54.0	-16.0	Vert
	Ave				-19.5						
34	5562.167	43.5	+1.2	+3.5	-31.8	+33.7	+0.0	50.1	54.0	-3.9	Vert
	Peak										
35	4635.167	46.2	+1.0	+3.2	-32.0	+32.5	+0.0	50.9	54.0	-3.1	Horiz
	Peak										
36	3708.167	56.5	+0.8	+2.8	-32.2	+30.6	+0.0	58.5	74.0	-15.5	Horiz
	Peak										
37	3708.167	56.5	+0.8	+2.8	-32.2	+30.6	+0.0	39.0	54.0	-15.0	Horiz
	Ave				-19.5						
38	2781.167	58.8	+0.8	+2.9	-32.7	+29.4	+0.0	59.2	74.0	-14.8	Horiz
	Peak										
39	2781.167	58.8	+0.8	+2.9	-32.7	+29.4	+0.0	39.7	54.0	-14.3	Horiz
	Ave				-19.5						

**Nemko USA, Inc.**

FCC PART 15, SUBPART C

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

*EUT: Dia-Track Truck Diagnostics and Tracking System* PROJECT NO.:2024RUS1

---

**Radiated Photographs**



**Section 8. Test Equipment List**

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07
1484	Cable	Storm PR90-010-072	N/A	10/02/06	10/02/07
1485	Cable	Storm PR90-010-216	N/A	10/02/06	10/02/07
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	04/20/06	04/20/07
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	02/13/06	02/13/07
1195	ANTENNA,BICONICAL	A.H. SYSTEMS SAS-200/542	235	02/10/06	02/10/07
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	04/20/06	04/20/07
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	05/26/06	05/26/08
1478	20db Attenuator DC 18 Ghz	MCL Inc. BW-S20W6	NONE	CBU	N/A
1629	CABLE, 6 ft	MEGAPHASE 10311 1GVT4	N/A	CBU	N/A
1469	10 db Attenuator DC 18 Ghz	MCL Inc. BW-S10W2 10db-2WDC	NONE	CBU	N/A

**Nemko USA, Inc.**

FCC PART 15, SUBPART C

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

*EUT: Dia-Track Truck Diagnostics and Tracking System* PROJECT NO.:2024RUS1

---

## **ANNEX A - TEST DETAILS**

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
---	----------------------

**Minimum Standard:** §15.207 Conducted limits.

(a) Except as shown in paragraphs (b) and (c) of this section, 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 in the following table, as measured using a 50 mH/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 lower limit applies at the boundary between the frequency ranges.

Frequency of Conducted Emission (MHz)	Limit (dBmV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 mV within the frequency band 535-1705 kHz, as measured using a 50 mH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as provided in §15.205 and §§15.209, 15.221, 15.223, 15.225 or 15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

NAME OF TEST: Channel Separation

PARA. NO.: 15.247(a)(1)

**Minimum Standard:**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

NAME OF TEST: Time of Occupancy

PARA. NO.: 15.247(a)(1)

**Minimum Standard:**

Frequency Band (MHz)	20 dB Bandwidth	No. of Hopping Channels	Average Time of Occupancy
902 - 928	<250 kHz	50	=<0.4 sec. in 20 sec.
902 – 928	=>250 kHz	25	=<0.4 sec. in 10 sec.
2400 – 2483.5	-----	75	=<0.4 sec. in 0.4 seconds multiplied by the number of hopping channels employed.
5725 – 5850	-----	75	=<0.4 sec. in 30 sec.

**Method Of Measurement:**

The spectrum analyzer is set as follows:

RBW: 1 MHz

VBW: = RBW

Span: 0 Hz

LOG dB/div.: 10 dB

Sweep: Sufficient to see one hop time sequence.

Trigger: Video

The occupancy time of one hop is measured as above. The average time of occupancy is calculated over the appropriate period of time from above table

Avg. time of occupancy = (period from table/duration of one hop)/no. of channels multiplied by the duration of one hop.

For instance:

If a 2.4 GHz system has a measured hop duration time of 1 msec. and uses 75 channels, then the average time of occupancy would be:

(30 sec./.001 sec.)/75 chan. = 400 x 1 msec. = 400 msec. or 0.4 sec. in 30 sec.

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(1)

**Minimum Standard:**

Frequency Band (MHz)	Maximum 20 dB Bandwidth
902 - 928	500 kHz
2400 – 2483.5	Not defined
5725 – 5850	1 MHz

**Method Of Measurement:**

The spectrum analyzer is set as follows:

RBW: At least 1% of span/div.

VBW: >RBW

Span: Sufficient to display 20 dB bandwidth

LOG dB/div.: 10 dB

Sweep: Auto

**Number of channels tested:**

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Peak Power Output

PARA. NO.: 15.247(b)

**Minimum Standard:**

Frequency Band (MHz)	No. of Hopping Channels	Maximum Peak Power Output at Antenna Port
902 - 928	at least 50	1 watt
902 – 928	25 - 49	0.25 watts
2400 – 2483.5	75	1 watt
5725 – 5850	75	1 watt

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

**Direct Measurement Method For Detachable Antennas:**

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

**Calculation Of EIRP For Integral Antenna:**

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation  $GP/4\pi R^2 = E^2/120\pi$  and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

The RBW of the spectrum analyzer shall be set to a value greater than the measured 20 dB occupied bandwidth of the E.U.T.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Spurious Emissions at Antenna Terminals PARA. NO.: 15.247(d)

**Minimum Standard:** In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength ( $\mu$ V/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

**Method Of Measurement:**

30 MHz - 10th harmonic plot

RBW: 100 kHz

VBW: 300 kHz

Sweep: Auto

Display line: -20 dBc

Lower Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 902 MHz, 2400 MHz, or 5725 MHz

Marker: Peak of fundamental emission

Marker  $\Delta$ : Peak of highest spurious level below center frequency.

Upper Band Edge

RBW: At least 1% of span/div.

VBW: >RBW

Span: As necessary to display any spurious at band edge.

Sweep: Auto

Center Frequency: 928 MHz, 2483.5 MHz, or 5850 MHz

Marker: Peak of fundamental emission

Marker  $\Delta$ : Peak of highest spurious level above center frequency.

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

NAME OF TEST: Radiated Spurious Emissions

PARA. NO.: 15.247(d)

**Minimum Standard:** In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits:

**Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:**

Frequency (MHz)	Field Strength ( $\mu$ V/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

**THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC**

#### 15.205 Restricted Bands

MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	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
6.125-6.218	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	322-335.4	3600-4400	Above 38.6
13.36-13.41	1718		

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

**Nemko USA, Inc.**

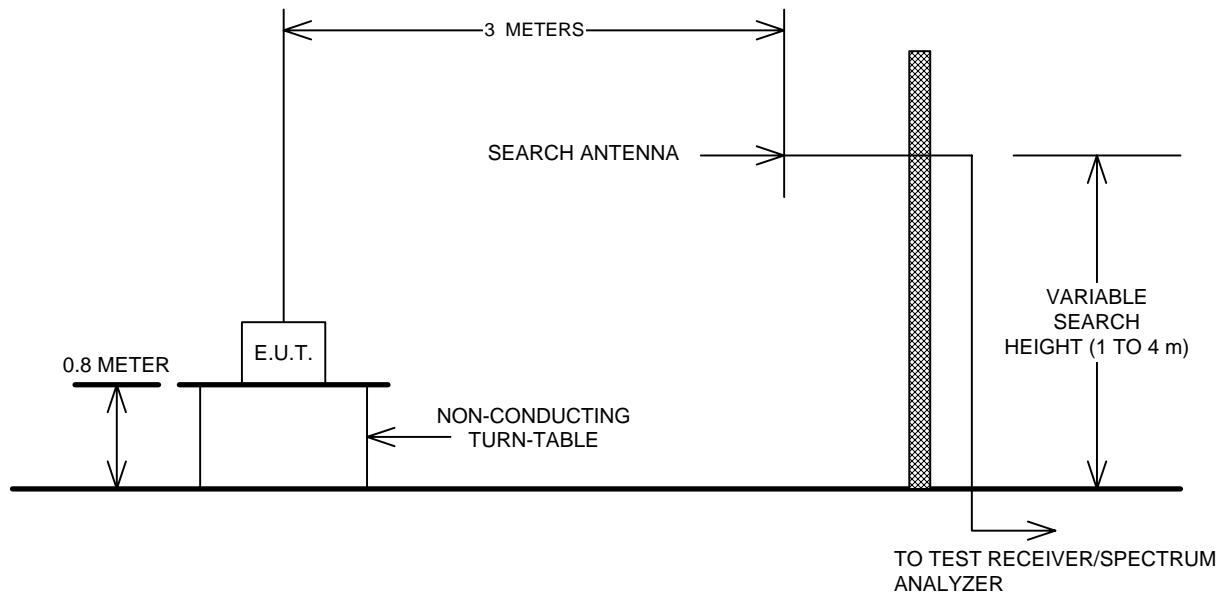
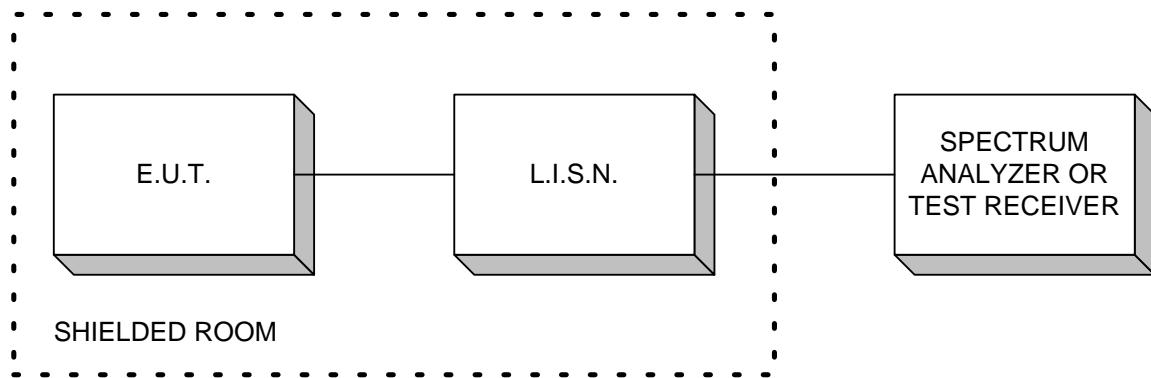
FCC PART 15, SUBPART C

FREQUENCY HOPPING SPREAD SPECTRUM TRANSMITTER

*EUT: Dia-Track Truck Diagnostics and Tracking System* PROJECT NO.:2024RUS1

---

**ANNEX B - TEST DIAGRAMS**

**Test Site For Radiated Emissions****Conducted Emissions**

**Peak Power at Antenna Terminals**

