SUBMITTAL APPLICATION REPORT

FOR GRANT OF CERTIFICATION

FOR

MODEL: CDR-915X Spread Spectrum Data Transmitter Module

902-928 MHz Transmitter

FOR

Coyote Datacom, Inc.
3941 Park Drive
El Dorado Hills, CA 65762

ROGERS LABS, INC.
4405 West 259th Terrace
Louisburg, KS 66053
Phone / Fax (913) 837-3214

ENGINEERING TEST REPORT FOR APLLICATION of GRANT of CERTIFICATION

FOR

CFR 47, PART 15C - INTENTIONAL RADIATORS
Paragraph 15.247
Spread Spectrum Frequency Hopping System
Operation in the 902-928 MHz band

For

COYOTE DATACOM, INC.
3941 Park Drive
El Dorado Hills, CA 65762
Keith Hollcroft,
Engineer

Model: CDR915 Spread Spectrum Data Transmitter Module
Frequency 902-928 MHz
FCC ID#: PHO-CDR915X
IC: 4315A-CDR915X

Test Date: January 22, 2006

Certifying Engineer: Scot D Rogers

Scot D. Rogers
ROGERS LABS, INC.
4405 West 259th Terrace
Louisburg, KS 66053
Phone: (913) 837-3214
FAX: (913) 837-3214

TABLE OF CONTENTS

FORWARD

The following information is submitted for consideration in obtaining a Grant of Certification for an intentional radiator operating as a spread spectrum frequency hopping intentional radiator module per CFR Paragraph 15.247 operation in the 902 - 928MHz band.

Name of Applicant: COYOTE DATACOM, INC.
3941 Park Drive, Suite 20-266
El Dorado Hills, CA 65762

Model: CDR915 Data Transmitter Module.

FCC ID: PHO-CDR915X
Industry Canada ID: 4315A-CDR915X
Frequency Range: 902-928 MHz.

Operating Power: 200 mW (as design specification, measured 118.5 dBµv/m @ 3 meters, 120.7 dBµv/m @ 3 meters (3dBi), 125.7 dBµv/m @ 3 meters (6dBi), 128.4 dBµv/m @ 3 meters (9dBi) antennas).

1) Applicable Standards & Test Procedures

a) In accordance with the Federal Communications Code of Federal Regulations, dated October 1, 2004, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, applicable parts of paragraph 15, Part 15C paragraphs 15.247, and FCC documents DA00-705 and DA00-1407 the following information is submitted for consideration in obtaining a grant of certification.

b) Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in the ANSI 63.4-2003 Document FCC and documents DA00-1407 and DA00-705.

2.1033(b) Application for Certification

(1) Manufacturer: COYOTE DATACOM, INC.
3941 Park Drive
El Dorado Hills, CA 65762

(2) Identification: Model: CDR915 Data Transmitter Module
FCC I.D.: PHO-CDR915X
IC: 4315A-CDR915X

(3) Instruction Book:

Refer to Exhibit for Instruction Manual.

(4) Description of Circuit Functions:

Refer to Exhibit of Operational Description.

(5) Block Diagram with Frequencies:

Refer to Exhibit of Operational Description.

(6) Report of Measurements:

Follows in this Report.

(7) Photographs: Construction, Component Placement, etc.:

Refer to Exhibit for photographs of equipment.

(8) Peripheral Equipment:

A computer communicating with the EUT was used during testing.

(9) Transition Provisions of 15.37 are not being requested.

(10) Frequency hopping Spread Spectrum transmitters:

Compliance with 15.247(a)(1) and the receiver bandwidth requirement are demonstrated in this report and exhibits.

(11) Not Applicable. The EUT is not a Scanning Receiver.

(12) Not Applicable. The EUT does not operate in the 59 – 64 GHz frequency band.

2) Equipment Tested

Equipment	Model	FCC I.D.#
EUT	CDR915 DATA TRANSMITTER MODULE	PHO-CDR915X
Computer	Dell/PP02X	DoC

3) Equipment Function and Testing Procedures

The EUT is a 902-928 MHz radio transmitter used to transmit data for use in the industrial market place. The CDR-915 Data Transmitter Module is a wireless link used for transmitting information from one remote location to another. The unit is marketed for developers wishing to incorporate a wireless link in a system solution. This product can reduce the development time for system engineers by utilizing the pre-developed transceiver into their system needs. The unit typically operates from a direct current voltage source supplied at the system level. For testing purposes, a twelve-volt wall transformer was used to power the unit. The device utilizes a FCC approved reverse SMA antenna connector for use with one of nine antenna configurations. The antenna options have been tested with data included in this report. The unit has provision to connect to a computer for data and command information. The EUT was tested with and without computer communications through the RS232 serial port. The EUT was tested in all standard equipment configurations and through all modes of operation.

4) Equipment and Cable Configurations

Conducted Emission Test Procedure

The test setup, including the EUT, was arranged in a test equipment configuration and placed on a 1 x 1.5-meter wooden bench, 0.8 meters high located in a screen room. The power lines of the system were isolated from the power source using a standard LISN with a 50-μHy choke. EMI was coupled to the spectrum analyzer through a 0.1 μF capacitor internal to the LISN. The LISN was positioned on the floor beneath the wooden bench supporting the EUT. The power lines and cables were draped over the back edge of the table.

Radiated Emission Test Procedure

The EUT was placed on a rotating 1 x 1.5-meter wooden platform, 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before data was taken using a spectrum analyzer. Refer to photographs in the test setup exhibit for EUT placement.

5) List of Test Equipment

A Hewlett Packard 8591EM Spectrum Analyzer was used as the measuring device for the emissions testing of frequencies below 1 GHz. A Hewlett Packard 8562A Spectrum Analyzer was used as the measuring device for testing the emissions at frequencies above 1 GHz. The analyzer settings used are described in the following table. Refer to the appendix for a complete list of Test Equipment.

HP 8591 EM ANALYZER SETTINGS		
CONDUCTED EMISSIONS:		
RBW	AVG. BW	DETECTOR FUNCTION
9 kHz	30 kHz	Peak / Quasi Peak
RADIATED EMISSIONS:		
RBW	AVG. BW	DETECTOR FUNCTION
120 kHz	300 kHz	Peak / Quasi Peak
HP 8562A ANALYZER SETTINGS		
RBW	VIDEO BW	DETECTOR FUNCTION
100 kHz	100 kHz	PEAK
1 MHz	1 MHz	Peak / Average

EQUIPMENT	MFG.	MODEL	CAL. DATE	DUE.
LISN	Comp. Design	FCC-LISN-2-MOD.CD	10/05	10/06
LISN	FCC	FCC-LISN-50-16-2-08	6/05	6/06
LISN	Comp. Design	1762	2/05	2/06
Antenna	ARA	BCD-235-B	10/05	10/06
Antenna	EMCO	3147	10/05	10/06
Antenna	EMCO	3143	5/05	5/06
Analyzer	HP	8591EM	5/05	5/06
Analyzer	HP	8562A	2/05	2/06

6) Units of Measurements

Conducted EMI: Data is in dBµV; dB referenced to one microvolt.

Radiated EMI: Data is in dBµV/m; dB/m referenced to one microvolt per meter.

Radiated Emissions Calculations:
Data taken for this report was taken at a distance of 3 meters.
Example data calculation
dBµV/m @ 3m = FSM(dBµV) + A.F.(dB) - Amp Gain(dB)
dBµV/m @ 3m = 47.9 + 7.4 – 30
= 25.3

7) Test Site Locations

Conducted EMI: The AC power line conducted emissions tests were performed in a shielded screen room located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.

Radiated EMI: The radiated emissions tests were performed at the 3 meters, Open Area Test Site (OATS) located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.

Site Approval: Refer to Appendix for FCC Site Approval Letter, Reference # 90910, Industry Canada Approval Letter, Reference #IC 3041.

8) SUBPART B – UNINTENTIONAL RADIATORS

Conducted EMI

The EUT was arranged in a typical equipment configuration and placed on a 1 x 1.5-meter wooden bench 80 cm above the conducting ground plane, floor of a screen room. The bench was positioned 40 cm away from the wall of the screen room. The LISN was positioned on the floor of the screen room 80-cm from the rear of the EUT. Testing for the line-conducted emissions was as follows. The ac adapter for the EUT was connected to the LISN for line-conducted emissions testing. A second LISN was positioned on the floor of the screen room 80-cm from the rear of the supporting equipment of the EUT. All power cords except the EUT were then powered from the second LISN. EMI was coupled to the spectrum analyzer through a 0.1 μF capacitor, internal to the LISN. Power line conducted emissions testing was carried out individually for each current carrying conductor of the EUT. The excess length of lead between the system and the LISN receptacle was folded back and forth to form a bundle not exceeding 40 cm in length. The screen room, conducting ground plane, analyzer, and LISN were bonded together to the protective earth ground. Preliminary testing was performed to identify the frequencies of each of these emissions, which had the highest amplitudes. The cables were repositioned to obtain maximum amplitude of measured EMI level. Once the worst-case configuration was identified, plots were made of the EMI from 0.15 MHz to 30 MHz then the data was recorded with maximum conducted emissions levels. Refer to Figures one and two for plots of the EUT conducted emissions frequency spectrum taken in the screen room.

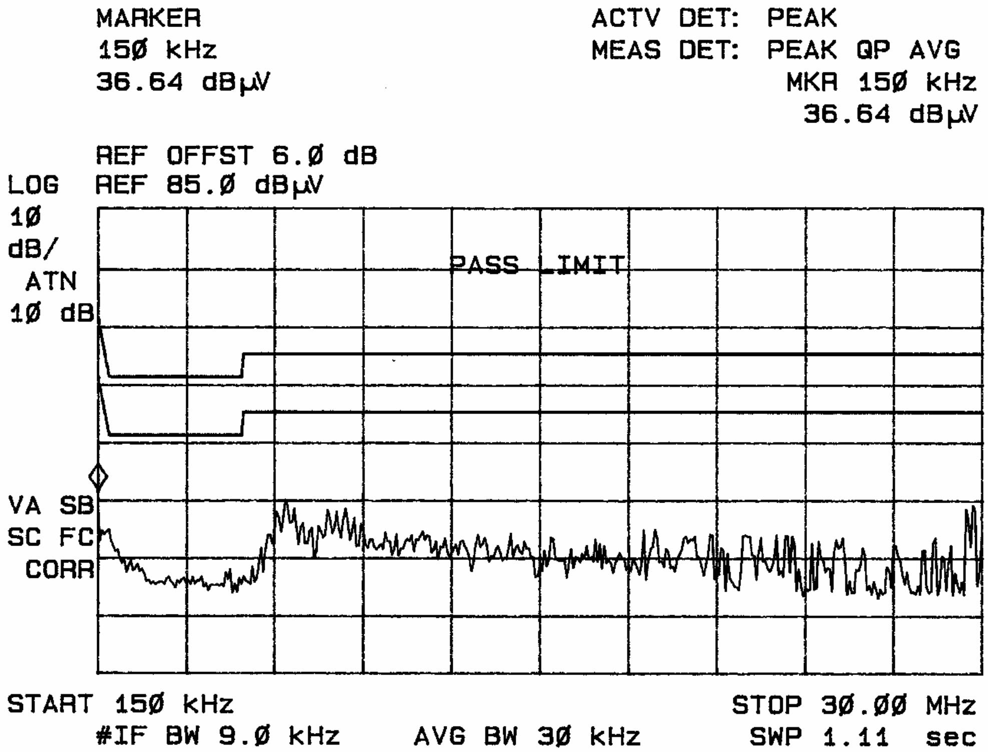

Figure one Conducted emissions of EUT line 1.

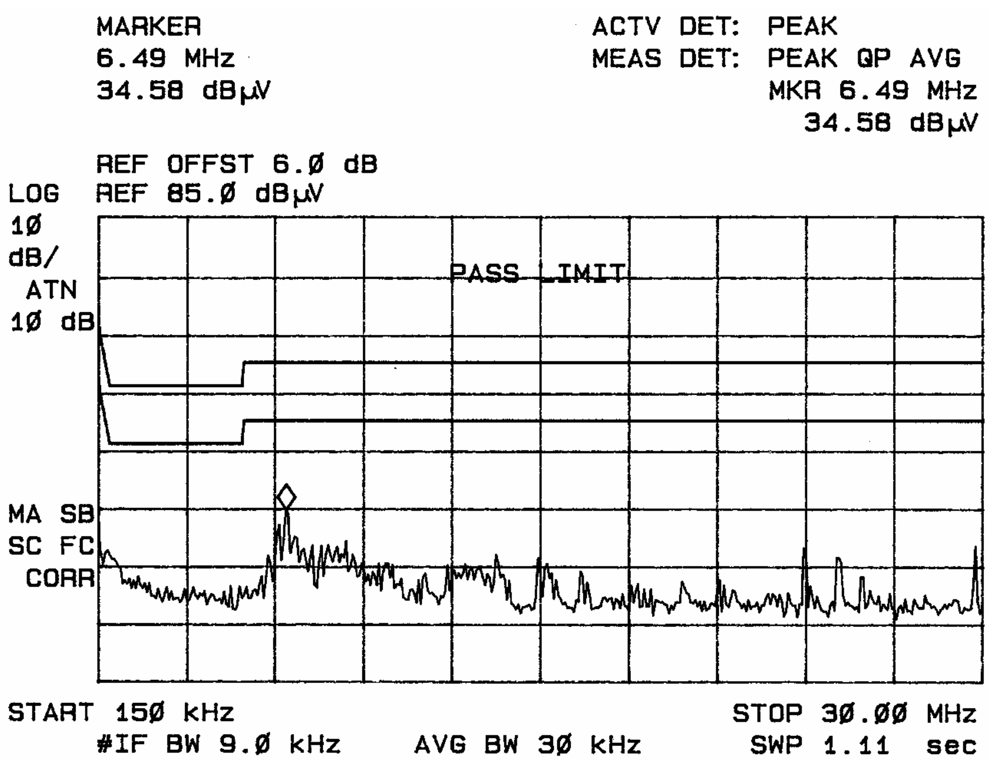

Figure two Conducted emissions of EUT line 2.

Radiated EMI

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Plots were made of the frequency spectrum from 30 MHz to 10,000 MHz for the preliminary testing. Refer to figures three through seven showing plots of the EUT radiated emissions spectrum taken in a screen room. The highest radiated emission was then re-maximized at the OATS location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the OATS at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna position between horizontal and vertical polarization. Antennas used were Broadband Biconical from 30 to 200 MHz, Biconilog from 30 to 1000 MHz, Log Periodic from 200 MHz to 5 GHz and or, pyramidal horns and mixers from 4 GHz to 10 GHz, notch filters and appropriate amplifiers were utilized.

Sample Calculations:

RFS = Radiated Field Strength

FSM = Field Strength Measured

A.F. = Receive Antenna Factor

Amp Gain = Pre-amplifier less cable losses

RFS(dBμV/m @ 3m) = FSM(dBμV) + A.F.(dB/m) - Amplifier Gain(dB)

dBμV/m @ 3m = dBμV + A.F. - Amplifier Gain

dBμV/m @ 3m = 47.9 + 7.4 - 30

RFS(dBμV/m @ 3m) = 25.3

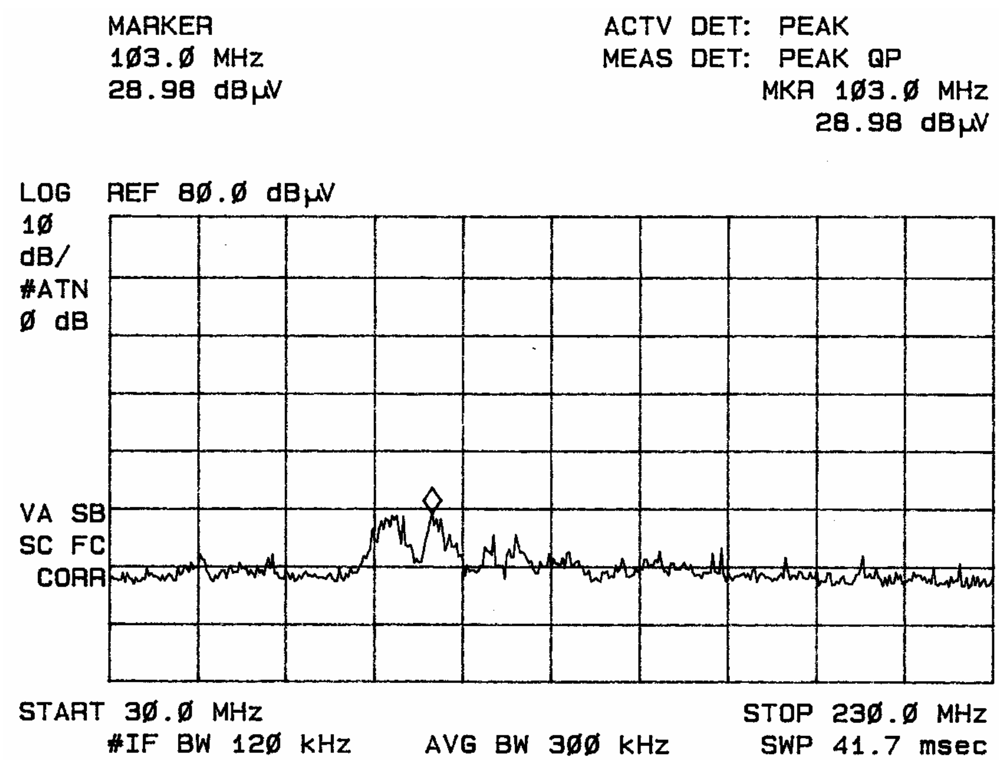

Figure 3 Radiated Emissions taken at 1 meter in screen room

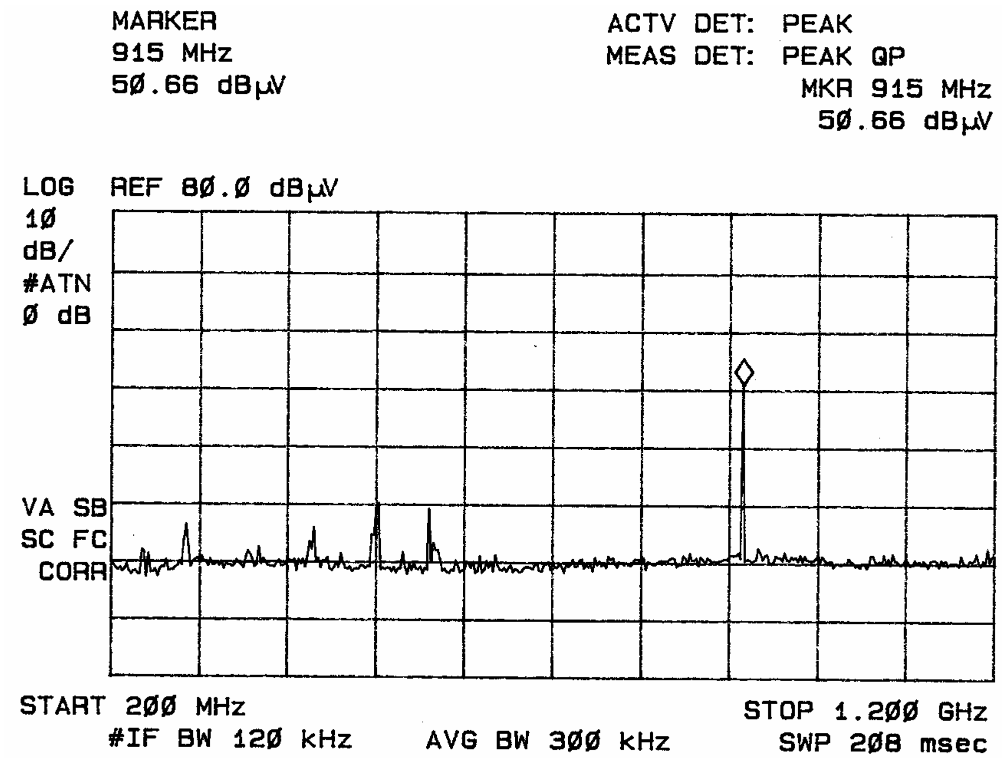

Figure 4 Radiated Emissions taken at 1 meter in screen room

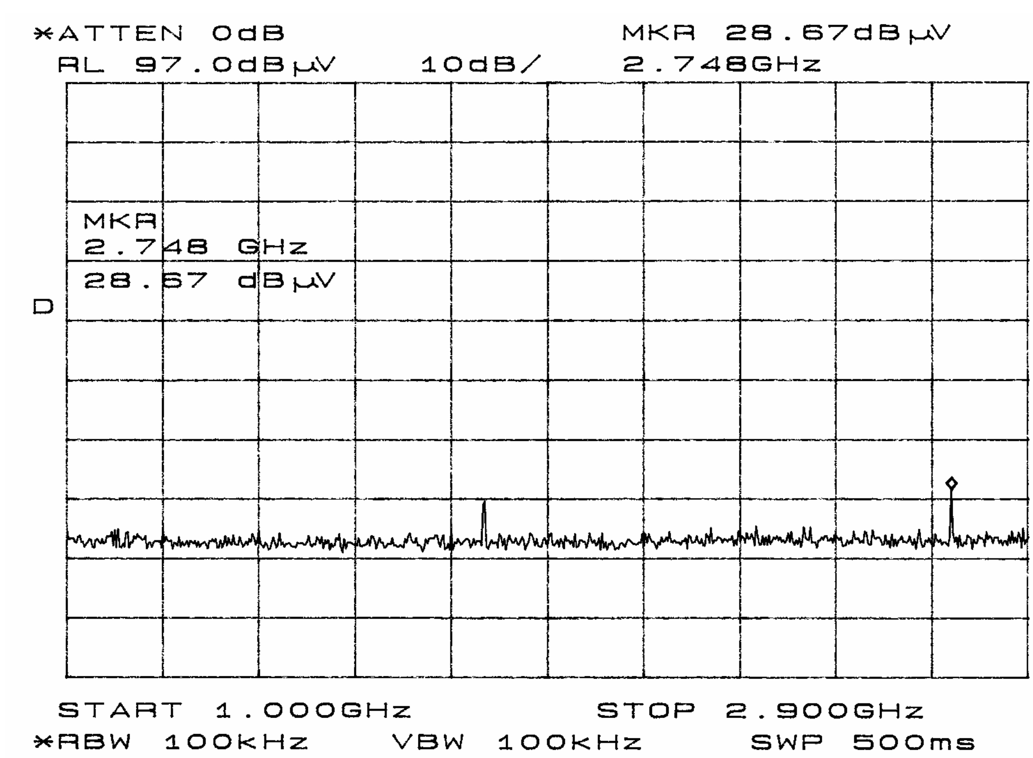

Figure 5 Radiated Emissions taken at 1 meter in screen room

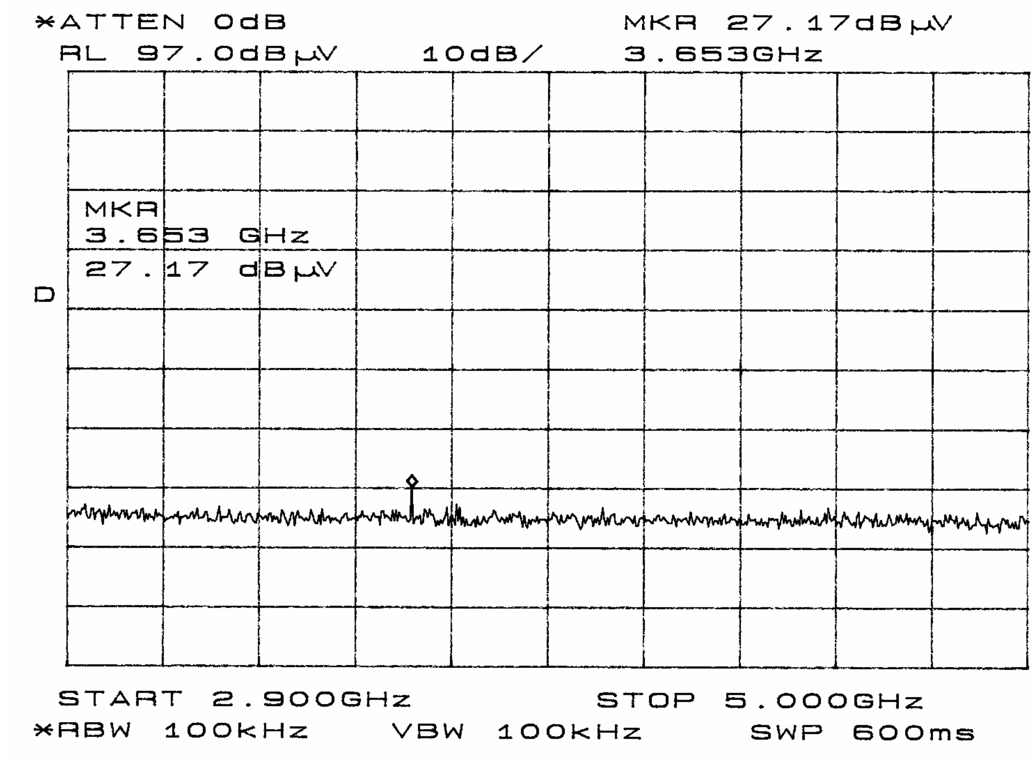

Figure 6 Radiated Emissions taken at 1 meter in screen room

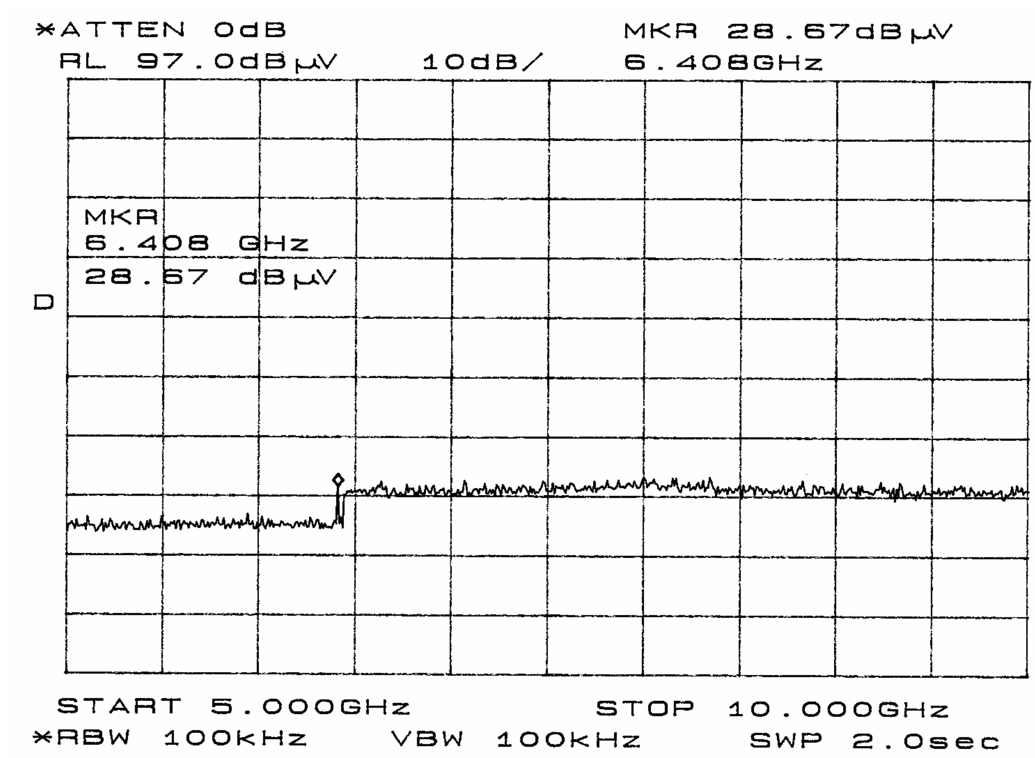

Figure 7 Radiated Emissions taken at 1 meter in screen room

Data Conducted Emissions (7 Highest Emissions)

Frequency band (MHz)	L1 Level (dBµV)			L2 Level (dBµV)			CISPR 22 Limit Q.P. / Ave(dBµV)
	Peak	Q.P.	AVE	Peak	Q.P.	AVE	
0.15 – 0.5	36.6	26.2	18.4	34.4	29.4	24.3	66 / 56
0.5 – 5	29.0	25.5	22.8	28.1	24.9	22.0	56 / 46
5 – 10	35.1	31.6	25.3	34.6	30.1	23.7	60 / 50
10 – 15	26.5	19.5	10.3	26.0	18.9	9.5	60 / 50
15 – 20	26.8	19.1	8.9	24.9	16.6	9.0	60 / 50
20 – 25	20.1	19.2	8.7	23.2	13..2	6.9	60 / 50
25 – 30	19.7	15.2	7.7	20.2	16.2	7.7	60 / 50

Other emissions present had amplitudes at least 20 dB below the limit.

Data General Radiated Emissions from EUT (6 Highest Emissions)

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
96.0	47.9	42.5	7.4	30	25.3	19.9	43.5
103.9	42.4	50.9	7.1	30	19.5	28.0	43.5
133.0	36.0	41.1	8.4	30	14.4	19.5	43.5
168.0	39.5	45.8	8.7	30	18.2	24.5	43.5
427.7	40.7	41.0	16.7	30	27.4	27.7	46.0
562.9	30.5	27.6	19.1	30	19.6	16.7	46.0

Other emissions present had amplitudes at least 20 dB below the limit.

Summary of Results for Conducted Emissions

The conducted emissions for the EUT meet the requirements for CISPR 22 and FCC Part 15B CLASS B Digital Devices. The CDR915 Data Transmitter Module had a 28.4 dB minimum margin below the CISPR quasi peak limit, and a 23.2 dB minimum margin below the CISPR average limit. Other emissions were present with amplitudes at least 20 dB below the limit. The recorded data represents the worst-case emissions amplitudes.

Summary of Results for Radiated Emissions

The radiated emissions for the EUT meet the requirements for CISPR 22 and FCC Part 15B CLASS B Digital Devices. The EUT had an 18.2 dB minimum margin below the Quasi-Peak limit. Other emissions were present with amplitudes at least 20 dB below the limit.

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the CISPR 22 or FCC Part 15B Class B emissions standards. There were no deviations to the specifications.

9) Subpart C - Intentional Radiators

As per CFR Part 15, Subpart C, paragraph 15.247 the following information is submitted for consideration in obtaining a Grant of Certification.

15.203 Antenna Requirements

The unit is produced with a FCC approved reverse SMA antenna connector to be used with approved and authorized antennas. The requirements of 15.203 are met there are no deviations or exceptions to the specification.

15.205 Restricted Bands of Operation

Spurious emissions falling in the restricted frequency bands of operation were measured at the OATS. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were checked at the OATS, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. The transmitter was tested while operating on at least three frequencies in the band of operation. Peak and average amplitudes of frequencies above 1000 MHz were compared to the required limits with worst-case data presented below. No other significant emission was observed which fell into the restricted bands of operation.

Sample Calculations:

RFS (dBµV/m @ 3m) = FSM(dBµV) + A.F.(dB) - Gain(dB)
= 39.8 + 6.7 - 30
= 16.5

Data Radiated Emissions in Restricted Bands

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
115.0	39.8	32.1	6.7	30	16.5	8.8	43.5
121.0	35.2	33.0	7.0	30	12.2	10.0	43.5
133.0	36.0	41.1	8.4	30	14.4	19.5	43.5
168.0	39.5	45.8	8.7	30	18.2	24.5	43.5
281.3	33.2	32.4	12.8	30	16.0	15.2	46.0
2707.2	39.5	36.0	35.5	30	45.0	41.5	54.0
3609.6	30.3	30.3	39.6	30	39.9	39.9	54.0
4512.0	28.1	30.6	45.1	30	43.2	45.7	54.0
2744.4	39.3	38.5	34.8	30	44.1	43.3	54.0
3659.2	34.3	39.8	39.3	30	43.6	49.1	54.0
4574.0	31.3	28.3	45.3	30	46.6	43.6	54.0
2782.8	37.0	34.5	34.8	30	41.8	39.3	54.0
3710.4	31.3	40.6	39.6	30	40.9	50.2	54.0
4638.0	25.7	29.5	44.3	30	40.0	43.8	54.0

Summary of Results for Radiated Emissions in Restricted Bands

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had a 3.8-dB minimum margin below the limits. No other emissions where found in the restricted frequency bands. Other emissions were present with amplitudes at least 20 dB below the FCC Limits.

15.209 Radiated Emissions General Requirements

Radiated EMI

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Plots were made of the frequency spectrum from 30 MHz to 10,000 MHz for the preliminary testing. Refer to figures three through seven as shown above of the radiated emissions spectrum taken in a screen room. The highest radiated emission was then re-maximized at the OATS location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the open field test site at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used were Broadband Biconical from 30 MHz to 200 MHz, Biconilog from 30 MHz to 1000 MHz, Log Periodic from 200 MHz to 5 GHz, and/or Pyramidal Horns from 4 GHz to 10 GHz.

Sample Calculation of radiated field strength

RFS = Radiated Field Strength
dBμV/m @ 3m = dBμV + A.F. - Amplifier Gain
dBμV/m @ 3m = 46.9 + 5.4 - 30
= 22.3

Data General Radiated Emissions from EUT (6 Highest Emissions)

Frequency in MHz	FSM Horz. (dBμV)	FSM Vert. (dBμV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBμV/m)	RFS Vert. @ 3m (dBμV/m)	FCC Class B Limit @ 3m (dBμV/m)
96.0	47.9	42.5	7.4	30	25.3	19.9	43.5
103.9	42.4	50.9	7.1	30	19.5	28.0	43.5
133.0	36.0	41.1	8.4	30	14.4	19.5	43.5
168.0	39.5	45.8	8.7	30	18.2	24.5	43.5
427.7	40.7	41.0	16.7	30	27.4	27.7	46.0
562.9	30.5	27.6	19.1	30	19.6	16.7	46.0

Other emissions present had amplitudes at least 20 dB below the limit.

Summary of Results for Radiated Emissions

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had an 18.2 dB minimum margin below the quasi-peak limits. Other emissions were present with amplitudes at least 20 db below the FCC limits.

15.247 Operation in the Band 902-928 MHz

The power output and harmonic emissions were measured both at the antenna connector and the on an open area test site at a three-meter distance. Both peak and average amplitude of radiated emissions were verified for compliance with worst-case data presented. The harmonic emissions in the restricted bands of operation were reported above and again in the following emissions table. Data was taken per Paragraph 2.1046(a) and 15.247. The 902 and 928 MHz band edges are protected due to the 902.4 – 927.6 MHz channels used for frequency of operation. Refer to figures eight through eighteen showing plots taken of the spectrum analyzer display demonstrating compliance with the specifications.

(a) The EUT is a frequency hopping spread spectrum intentional radiator utilizing at least 25 hopping channels. The 20-dB bandwidth of 254 kHz meets the requirements of more than 250 kHz wide, using at least 25 hopping channels, with the average time of occupancy on any frequency not greater than 0.4 seconds within a ten-second time-period. Information showing compliance for dwell time of occupancy and hopping sequence are displayed below.

Antenna Conducted power measurement

Frequency (MHz)	Power (Watts)
902.4	0.200
914.8	0.200
927.6	0.200

This is the psuedo random channel lookup table…

```
flash const unsigned char TX_TABLE[] = { 0, 26, 4, 10, 46, 34, 14, 40, 6, 20,
36, 16, 22, 12, 24, 44, 18, 28, 32, 8, 38, 30, 42, 2, 48 };
```

This routine initiates the channel change for the next TX channel. The routine sequentially goes through the channels in the randomized table above. This guarantees that all channels are used equally.

```
void GotoNextTxChannel (void)
{  tx_channel++;
  if ( tx_channel > 24 )
   {
        tx_channel = 0;             //start at beginning of table
        while (scan_timer);         //check for FCC time limit
        scan_timer = FCC_TIME;  //reset 10 second timer
}
```

The Data Radio utilizes two methods for limiting channel occupancy to 400 mS per channel in a 10 second interval. When the radio is streaming data, packet transmissions are set at 150 mS. Guaranteeing that each channel is used equally there is no possibility of any channel transmitting more than 400 mS in any
10 second period.

The second limitation is imposed using a simple software driven timer. Each time the transmitter uses channel 1 in the transmit hop table a 10 second timer is started. In the event the radio goes through the entire table and back to channel 1 before the 10 seconds has elapsed, the radio is forced to wait in receive mode the remainder of the 10 second period.

These two tests applied together guarantee that the CDR-915 will not, in any case, exceed the channel occupancy limitations set forth by the FCC part 15 rules for frequency hopping transmitters.

(b) The maximum peak output power of the unit was measured at the antenna port and open area test site since. The amplitudes of each emission and spurious emission were measured at a distance of 3 meters from the FSM antenna at the OATS. The amplitude of each emission was maximized by varying the FSM antenna height, polarization, and by rotating the turntable. A Biconilog Antenna was used for measuring emissions from 30 to 1000 MHz, Log Periodic Antenna for 200 to 5000 MHz, and Pyramidal Horn antennas from 4 GHz to 10 GHz. Emissions were measured in dBµV/m at three-meters.

The band edges are protected due to the frequency of operation of the EUT.

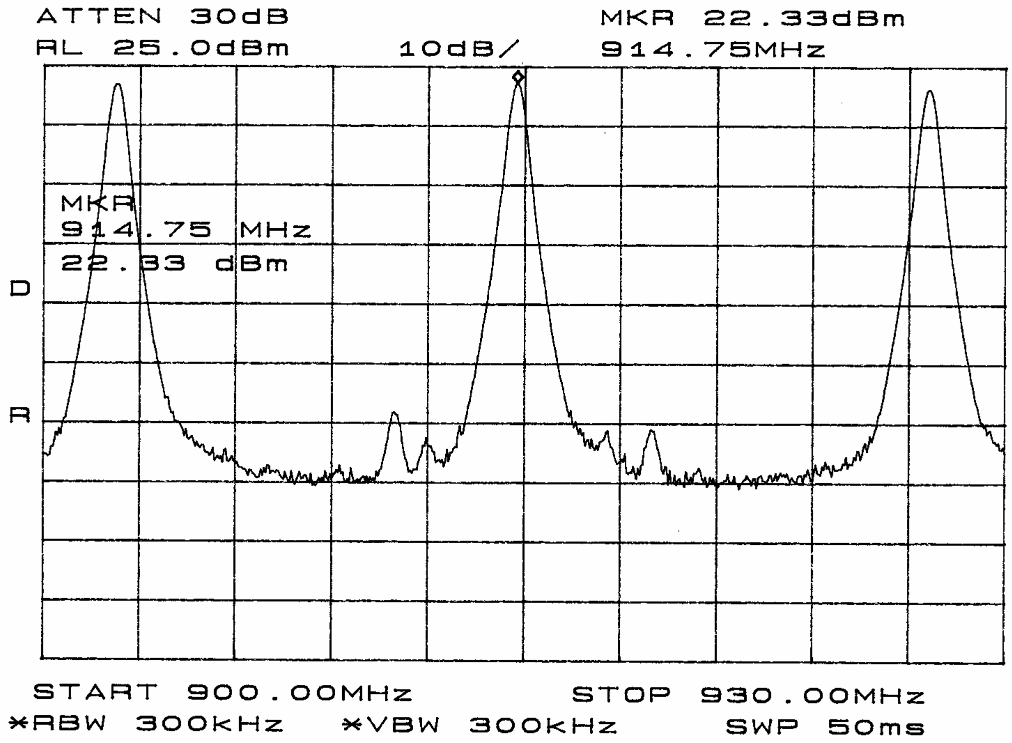

Figure 8 Maximum Power output and band edge

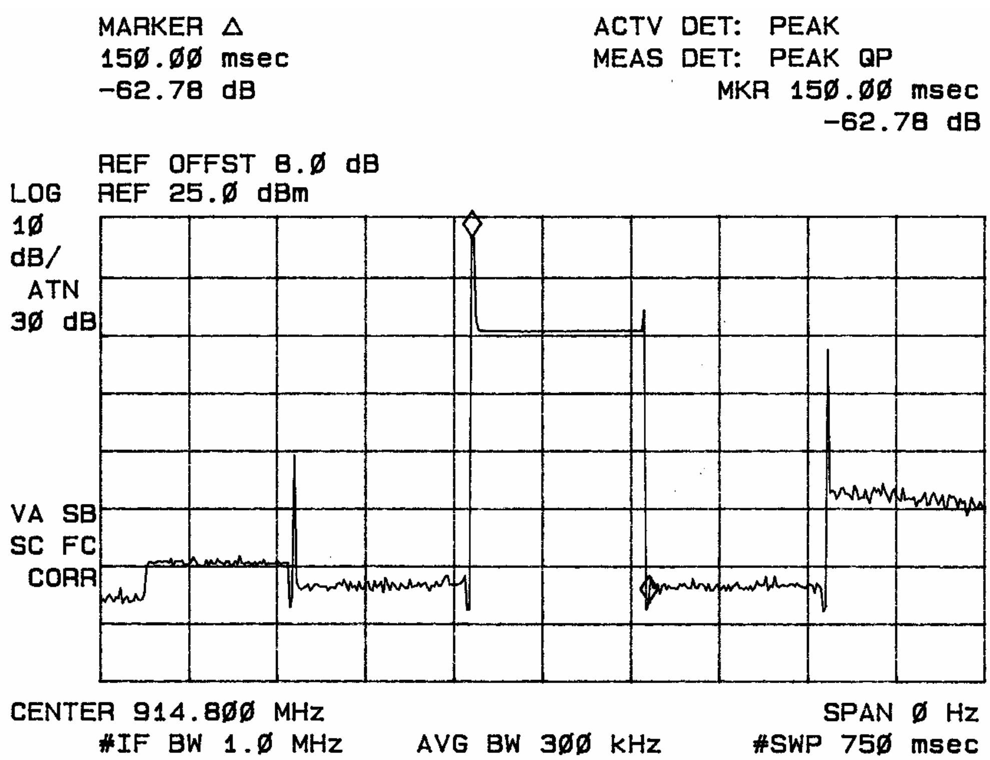

Figure 9 Dwell Time of Occupancy.

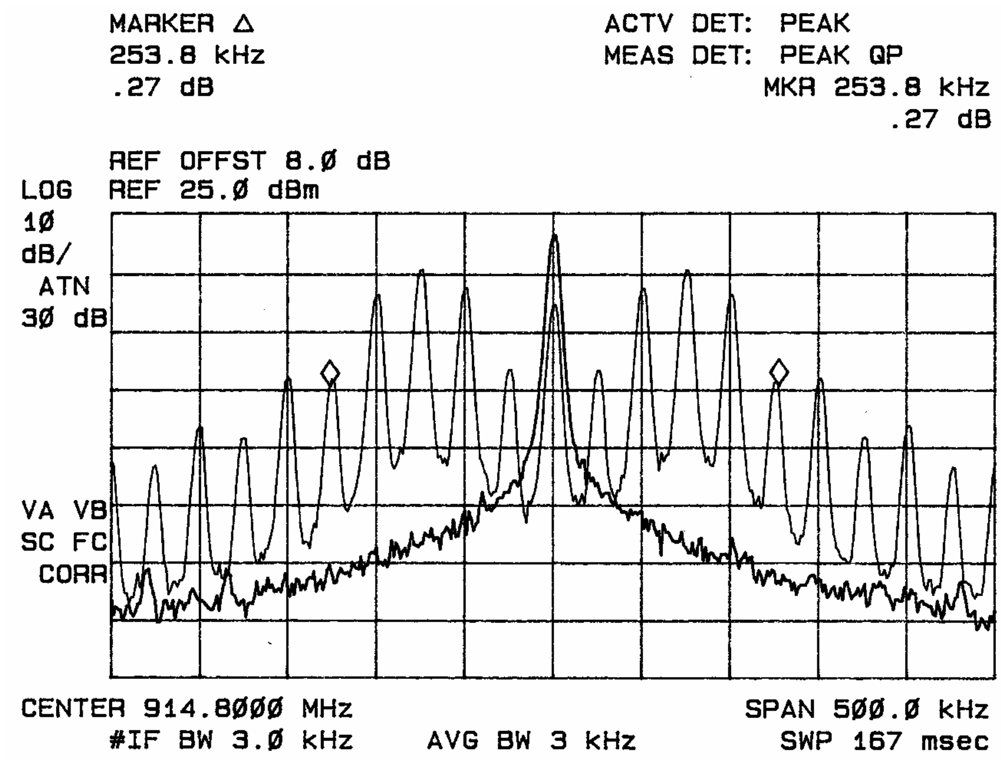

Figure 10 20-dB bandwidth.

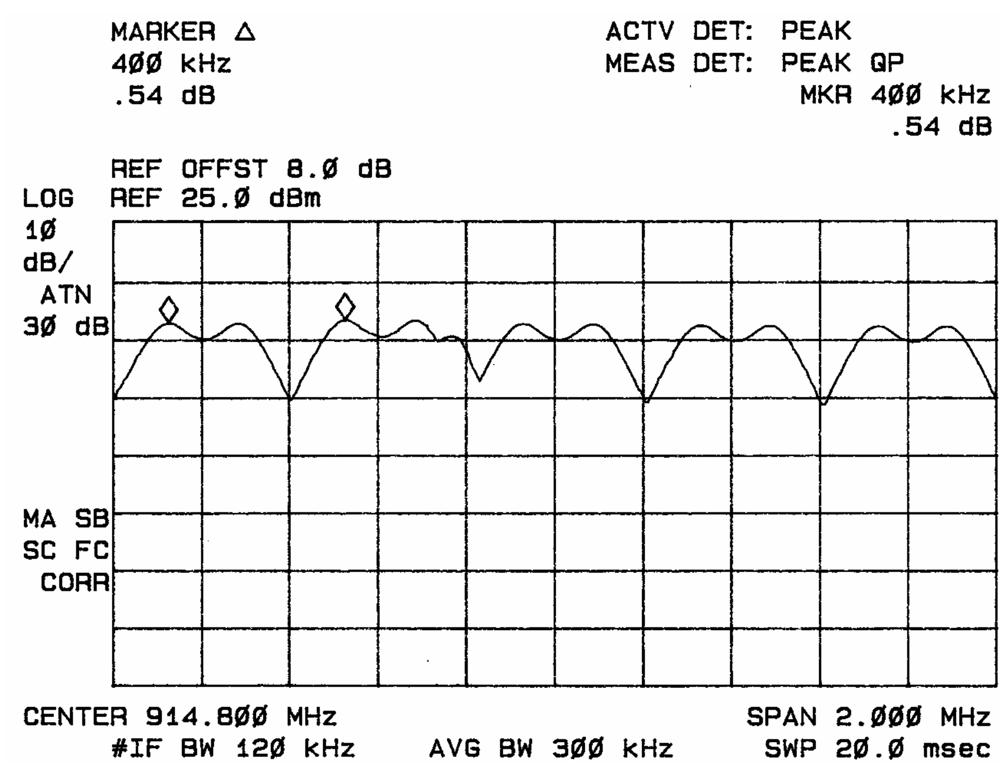

Figure 11 Channel Spacing.

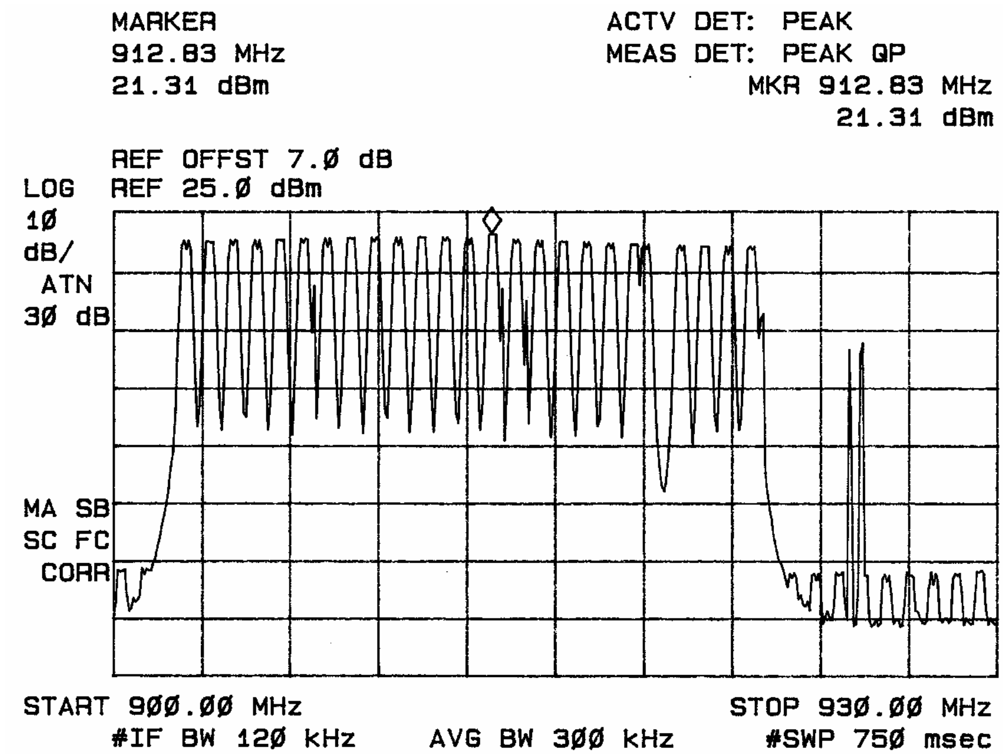

Figure 12 plot showing at least 25 hopping channels.

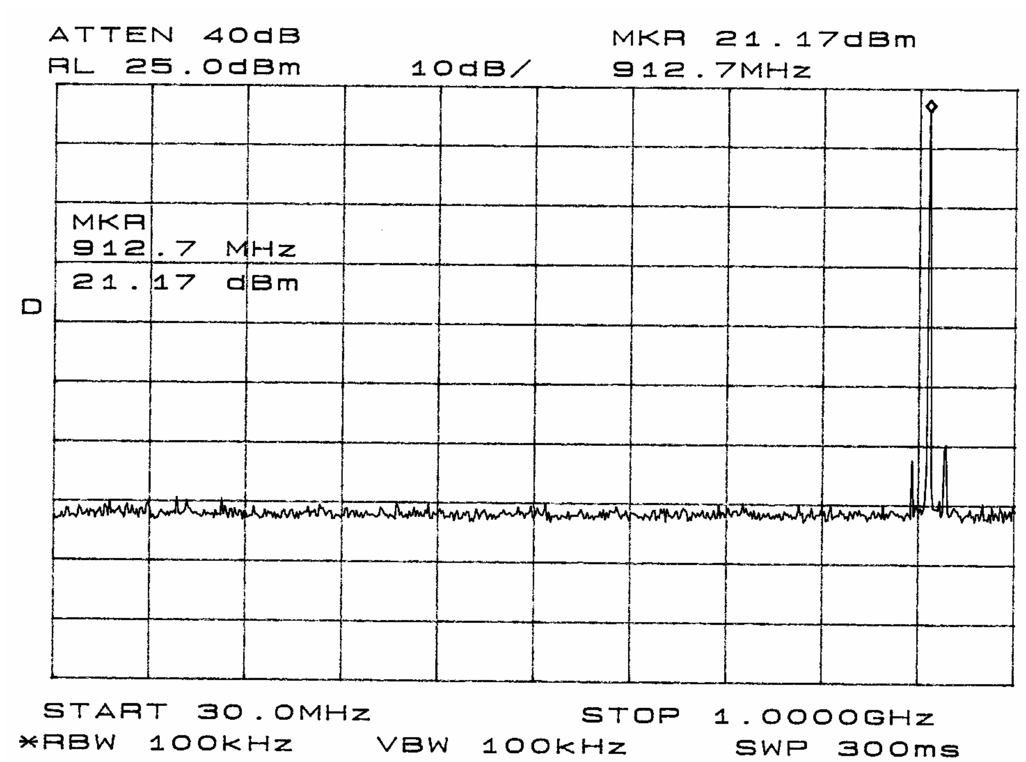

Figure 13 plot showing antenna conducted emissions plot.

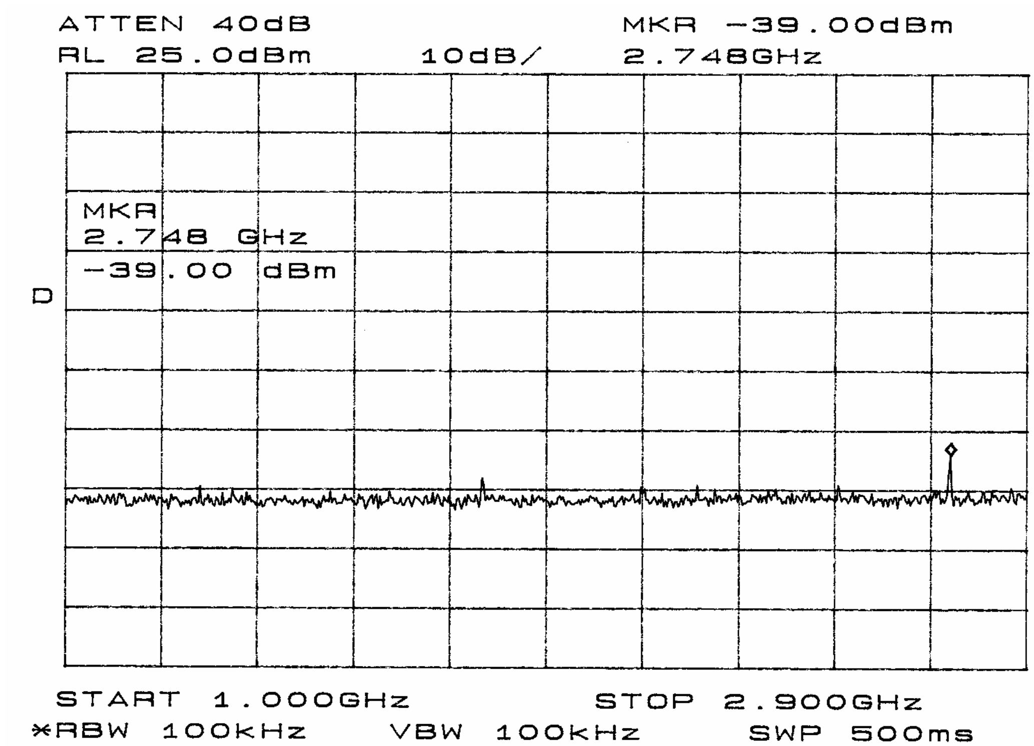

Figure 14 plot showing antenna conducted emissions plot.

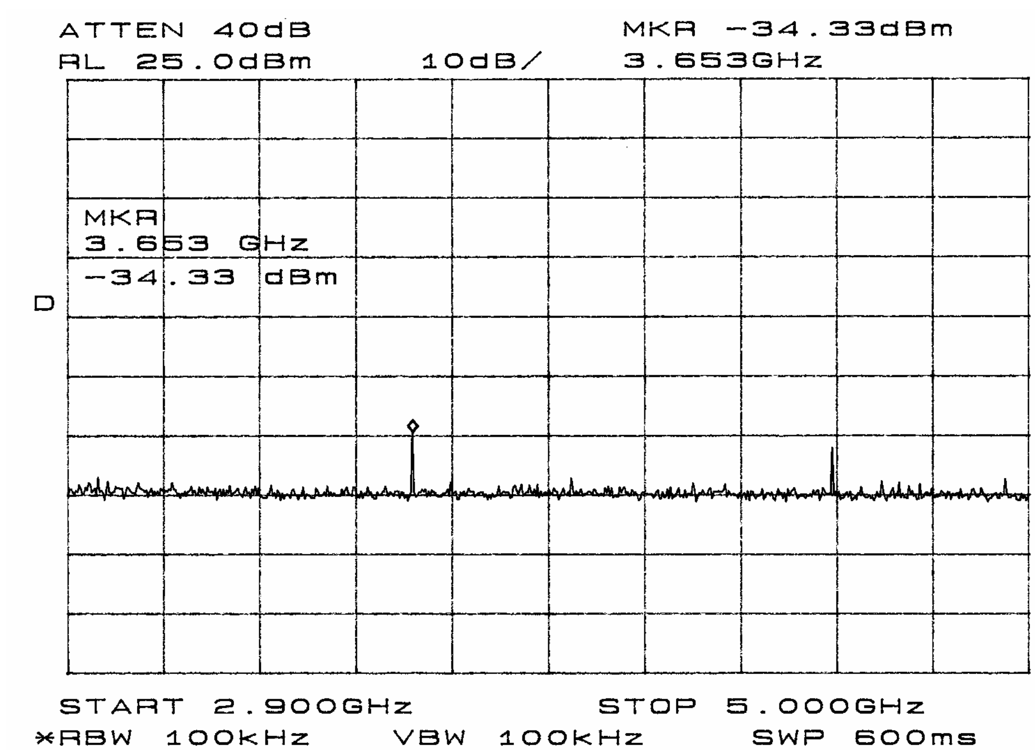

Figure 15 showing antenna conducted emissions plot.

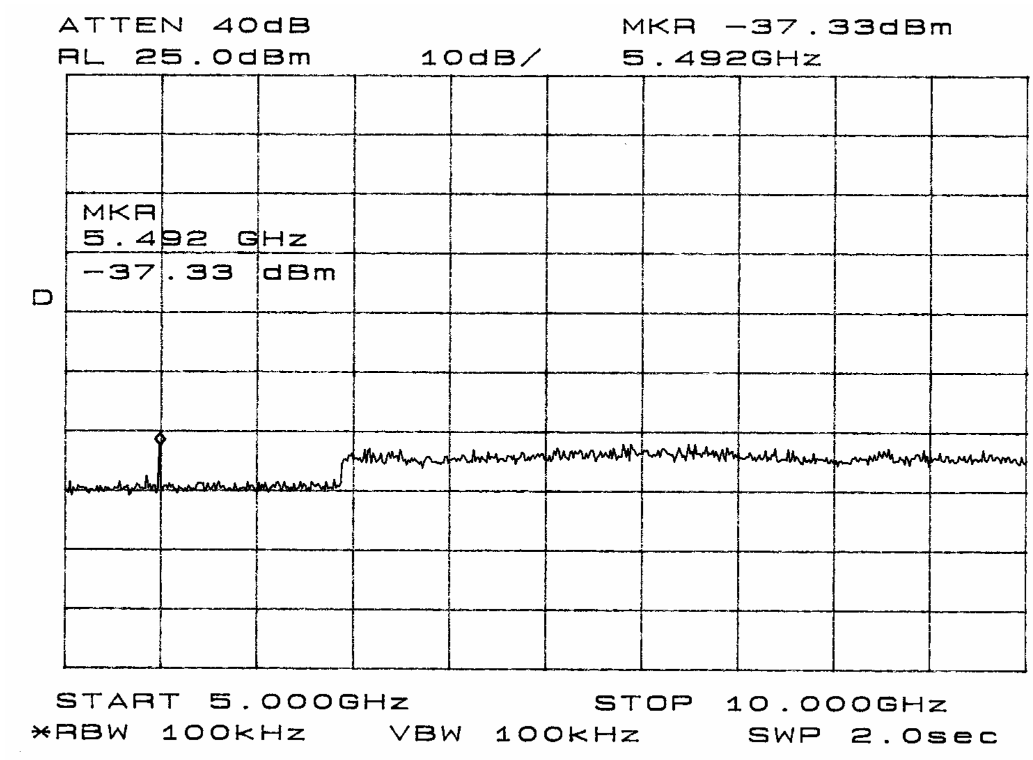

Figure 16 showing antenna conducted emissions plot.

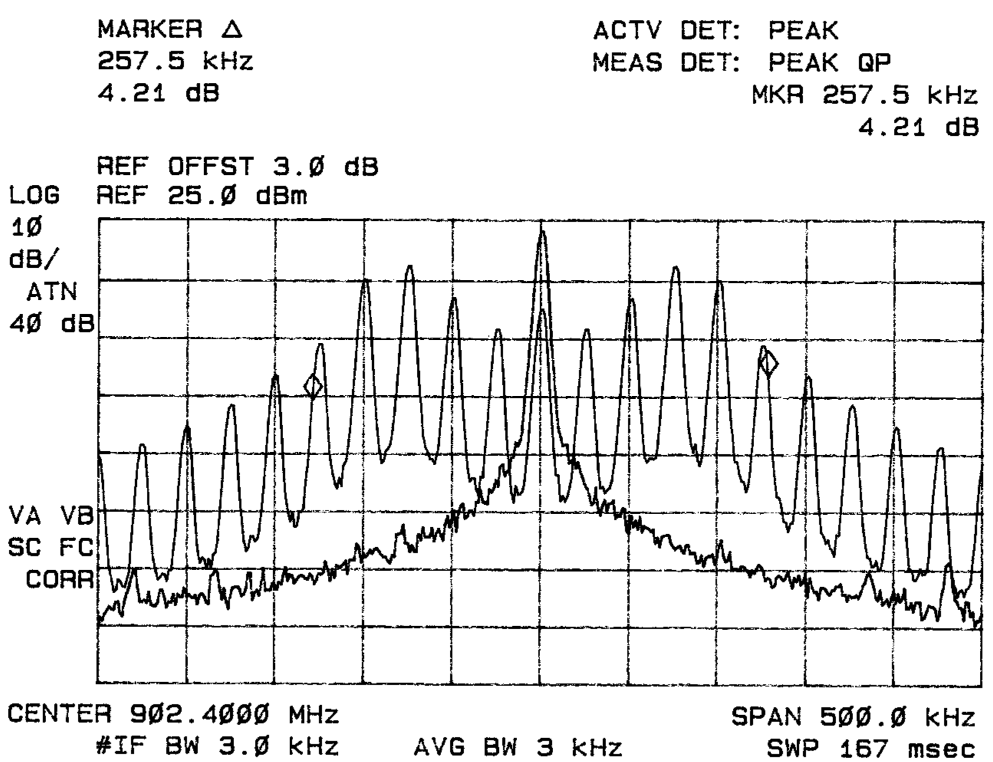

Figure 17 Occupied Bandwidth low channel.

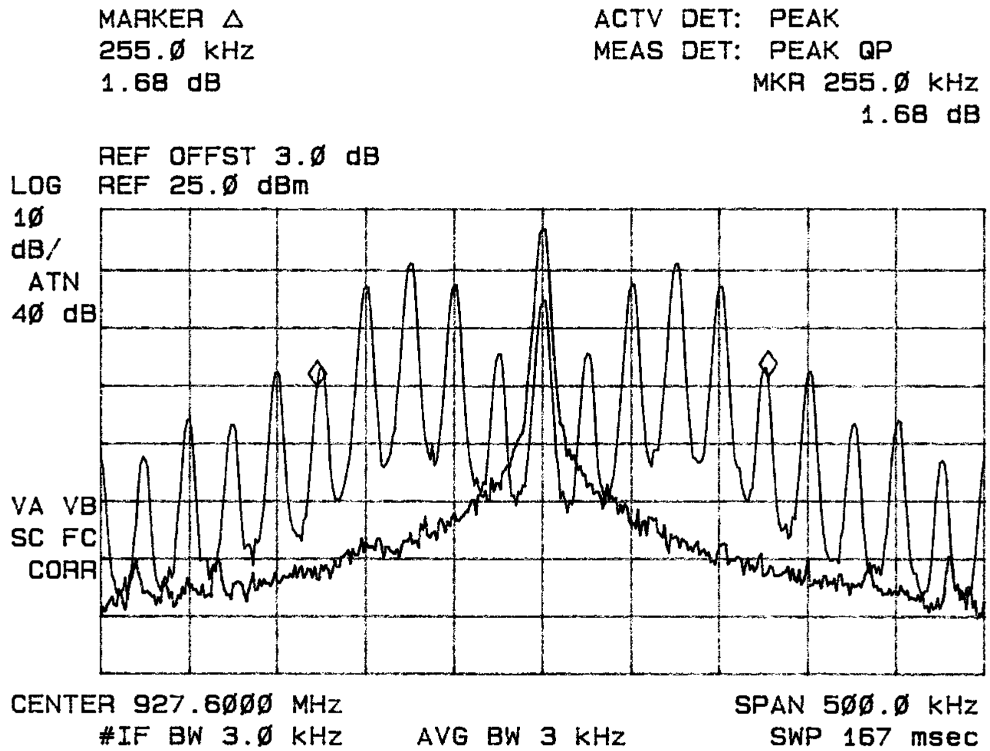

Figure 18 Occupied Bandwidth high channel.

Sample calculation of radiated field strength

dBμv/m @ 3m = FSM + A.F. - cable loss - amplifier gain
= 92.7 + 23.3 - 0
= 116.0

ANT-915DEV ¼ wave rubber antenna Data

Data Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
902.4	92.7	95.2	23.3	0	116.0	118.5	
1804.8	42.7	48.3	29.1	30	41.8	47.4	54.0
2707.2	33.2	37.0	35.5	30	38.7	42.5	54.0
3609.6	32.5	39.1	39.6	30	42.1	48.7	54.0
4512.0	21.6	24.5	45.1	30	36.7	39.6	54.0
914.8	91.7	94.3	23.7	0	115.4	118.0	
1829.6	40.8	45.1	29.2	30	40.0	44.3	54.0
2744.4	34.8	38.6	34.8	30	39.6	43.4	54.0
3659.2	34.3	28.3	39.3	30	43.6	37.6	54.0
4574.0	24.6	26.0	45.3	30	39.9	41.3	54.0
927.6	91.8	94.5	23.9	0	115.7	118.4	
1855.2	43.0	48.3	29.1	30	42.1	47.4	54.0
2782.8	32.8	37.0	34.8	30	37.6	41.8	54.0
3710.4	33.5	34.6	39.6	30	43.1	44.2	54.0
4638.0	25.0	26.8	44.3	30	39.3	41.1	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
904.6	92.7	95.2	20.7	23.2
914.8	91.7	94.3	20.0	22.6
927.6	91.8	94.5	20.3	23.0

ANT-915CW ¼ wave shortened rubber antenna Data

Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
902.4	92.8	94.2	23.3	0	116.1	117.5	
1804.8	40.8	48.3	29.1	30	39.9	47.4	54.0
2707.2	32.5	36.0	35.5	30	38.0	41.5	54.0
3609.6	32.8	38.0	39.6	30	42.4	47.6	54.0
4512.0	22.5	21.0	45.1	30	37.6	36.1	54.0
914.8	90.2	93.5	23.7	0	113.9	117.2	
1829.6	40.5	45.0	29.2	30	39.7	44.2	54.0
2744.4	35.5	38.3	34.8	30	40.3	43.1	54.0
3659.2	34.8	36.0	39.3	30	44.1	45.3	54.0
4574.0	22.3	23.3	45.3	30	37.6	38.6	54.0
927.6	90.5	92.7	23.9	0	114.4	116.6	
1855.2	40.3	47.3	29.1	30	39.4	46.4	54.0
2782.8	32.3	35.7	34.8	30	37.1	40.5	54.0
3710.4	35.4	36.5	39.6	30	45.0	46.1	54.0
4638.0	23.5	22.8	44.3	30	37.8	37.1	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
904.6	92.8	94.2	20.7	22.2
914.8	90.2	93.5	18.6	21.9
927.6	90.5	92.7	19.1	21.3

MUF9000 ¼ wave mobile antenna Data

Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
902.4	86.1	89.0	23.3	0	109.4	112.3	
1804.8	46.2	47.1	29.1	30	45.3	46.2	54.0
2707.2	33.3	37.5	35.5	30	38.8	43.0	54.0
3609.6	34.5	32.5	39.6	30	44.1	42.1	54.0
4512.0	22.7	24.2	45.1	30	37.8	39.3	54.0
914.8	87.3	89.4	23.7	0	111.0	113.1	
1829.6	40.1	43.5	29.2	30	39.3	42.7	54.0
2744.4	33.5	33.0	34.8	30	38.3	37.8	54.0
3659.2	33.0	28.0	39.3	30	42.3	37.3	54.0
4574.0	28.3	24.3	45.3	30	43.6	39.6	54.0
927.6	86.5	88.7	23.9	0	110.4	112.6	
1855.2	35.8	47.5	29.1	30	34.9	46.6	54.0
2782.8	29.3	33.8	34.8	30	34.1	38.6	54.0
3710.4	32.5	34.8	39.6	30	42.1	44.4	54.0
4638.0	28.1	26.8	44.3	30	42.4	41.1	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
904.6	86.1	89.0	14.2	17.0
914.8	87.3	89.4	15.6	17.9
927.6	86.5	88.7	15.2	17.3

PC904N 6dBi Gain Data

Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
902.4	101.5	87.7	23.3	0	124.8	111.0	
1804.8	44.5	41.3	29.1	30	43.6	40.4	54.0
2707.2	38.3	38.4	35.5	30	43.8	43.9	54.0
3609.6	33.6	26.2	39.6	30	43.2	35.8	54.0
4512.0	29.6	28.8	45.1	30	44.7	43.9	54.0
914.8	100.8	88.8	23.7	0	124.5	112.5	
1829.6	41.8	36.3	29.2	30	41.0	35.5	54.0
2744.4	34.6	33.6	34.8	30	39.4	38.4	54.0
3659.2	30.5	26.5	39.3	30	39.8	35.8	54.0
4574.0	29.0	30.1	45.3	30	44.3	45.4	54.0
927.6	100.0	88.3	23.9	0	123.9	112.2	
1855.2	40.0	38.6	29.1	30	39.1	37.7	54.0
2782.8	38.6	34.6	34.8	30	43.4	39.4	54.0
3710.4	30.3	26.0	39.6	30	39.9	35.6	54.0
4638.0	29.8	30.3	44.3	30	44.1	44.6	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
904.6	101.5	87.7	29.5	15.8
914.8	100.8	88.8	29.3	17.3
927.6	100.0	88.3	28.7	17.0

PC906N 9dBi Gain Data

Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
902.4	104.9	89.0	23.3	0	128.2	112.3	
1804.8	42.5	45.2	29.1	30	41.6	44.3	54.0
2707.2	36.5	35.5	35.5	30	42.0	41.0	54.0
3609.6	29.8	31.0	39.6	30	39.4	40.6	54.0
4512.0	28.0	31.5	45.1	30	43.1	46.6	54.0
914.8	104.7	88.5	23.7	0	128.4	112.2	
1829.6	42.3	44.9	29.2	30	41.5	44.1	54.0
2744.4	36.6	35.8	34.8	30	41.4	40.6	54.0
3659.2	30.3	32.0	39.3	30	39.6	41.3	54.0
4574.0	28.5	32.0	45.3	30	43.8	47.3	54.0
927.6	103.8	86.5	23.9	0	127.7	110.4	
1855.2	40.3	43.2	29.1	30	39.4	42.3	54.0
2782.8	35.5	33.7	34.8	30	40.3	38.5	54.0
3710.4	27.8	29.8	39.6	30	37.4	39.4	54.0
4638.0	27.2	30.3	44.3	30	41.5	44.6	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
904.6	104.9	89.0	33.0	17.0
914.8	104.7	88.5	33.1	17.0
927.6	103.8	86.5	32.5	15.2

YS8963 6dBi Gain Data

Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
902.4	101.5	91.2	23.3	0	124.8	114.5	
1804.8	42.0	46.5	29.1	30	41.1	45.6	54.0
2707.2	37.8	35.8	35.5	30	43.3	41.3	54.0
3609.6	30.0	32.6	39.6	30	39.6	42.2	54.0
4512.0	27.5	29.0	45.1	30	42.6	44.1	54.0
914.8	102.0	92.5	23.7	0	125.7	116.2	
1829.6	44.6	44.3	29.2	30	43.8	43.5	54.0
2744.4	38.6	35.2	34.8	30	43.4	40.0	54.0
3659.2	29.0	32.1	39.3	30	38.3	41.4	54.0
4574.0	30.0	29.5	45.3	30	45.3	44.8	54.0
927.6	100.7	89.5	23.9	0	124.6	113.4	
1855.2	38.5	46.8	29.1	30	37.6	45.9	54.0
2782.8	39.3	35.3	34.8	30	44.1	40.1	54.0
3710.4	28.8	30.8	39.6	30	38.4	40.4	54.0
4638.0	28.5	34.4	44.3	30	42.8	48.7	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
904.6	101.5	91.2	29.5	19.2
914.8	102.0	92.5	30.4	21.0
927.6	100.7	89.5	29.4	18.2

YS8966 9dBi Gain Data

Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
902.4	104.7	88.2	23.3	0	128.0	111.5	
1804.8	43.7	46.6	29.1	30	42.8	45.7	54.0
2707.2	39.5	36.0	35.5	30	45.0	41.5	54.0
3609.6	30.3	30.3	39.6	30	39.9	39.9	54.0
4512.0	28.1	30.6	45.1	30	43.2	45.7	54.0
914.8	104.7	88.2	23.7	0	128.4	111.9	
1829.6	41.3	42.3	29.2	30	40.5	41.5	54.0
2744.4	39.3	38.5	34.8	30	44.1	43.3	54.0
3659.2	34.3	39.8	39.3	30	43.6	49.1	54.0
4574.0	31.3	28.3	45.3	30	46.6	43.6	54.0
927.6	103.7	88.8	23.9	0	127.6	112.7	
1855.2	43.0	44.6	29.1	30	42.1	43.7	54.0
2782.8	37.0	34.5	34.8	30	41.8	39.3	54.0
3710.4	31.3	40.6	39.6	30	40.9	50.2	54.0
4638.0	25.7	29.5	44.3	30	40.0	43.8	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
904.6	104.7	88.2	32.8	16.3
914.8	104.7	88.2	33.1	16.7
927.6	103.7	88.8	32.4	17.5

FG8963 3dBi Gain Data

Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBμV)	FSM Vert. (dBμV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBμV/m)	RFS Vert. @ 3m (dBμV/m)	Limit @ 3m (dBμV/m)
902.4	97.2	83.5	23.3	0	120.5	106.8	
1804.8	39.5	45.0	29.1	30	38.6	44.1	54.0
2707.2	34.0	36.5	35.5	30	39.5	42.0	54.0
3609.6	29.0	36.6	39.6	30	38.6	46.2	54.0
4512.0	27.0	30.6	45.1	30	42.1	45.7	54.0
914.8	97.0	83.5	23.7	0	120.7	107.2	
1829.6	39.5	43.5	29.2	30	38.7	42.7	54.0
2744.4	35.1	35.1	34.8	30	39.9	39.9	54.0
3659.2	29.2	34.7	39.3	30	38.5	44.0	54.0
4574.0	27.5	31.8	45.3	30	42.8	47.1	54.0
927.6	96.8	82.7	23.9	0	120.7	106.6	
1855.2	39.5	42.3	29.1	30	38.6	41.4	54.0
2782.8	36.5	34.5	34.8	30	41.3	39.3	54.0
3710.4	29.2	35.0	39.6	30	38.8	44.6	54.0
4638.0	26.5	28.3	44.3	30	40.8	42.6	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBμV	dBμV	dBm	dBm
904.6	97.2	83.5	25.3	11.6
914.8	97.0	83.5	25.5	12.0
927.6	96.8	82.7	25.4	11.3

FG8966 6dBi Gain Data

Radiated Emissions from EUT

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
902.4	100.5	85.2	23.3	0	123.8	108.5	
1804.8	38.6	40.2	29.1	30	37.7	39.3	54.0
2707.2	34.2	38.6	35.5	30	39.7	44.1	54.0
3609.6	28.5	30.5	39.6	30	38.1	40.1	54.0
4512.0	27.5	28.2	45.1	30	42.6	43.3	54.0
914.8	102.0	85.3	23.7	0	125.7	109.0	
1829.6	39.8	43.8	29.2	30	39.0	43.0	54.0
2744.4	36.2	35.8	34.8	30	41.0	40.6	54.0
3659.2	29.6	31.0	39.3	30	38.9	40.3	54.0
4574.0	27.7	30.6	45.3	30	43.0	45.9	54.0
927.6	100.8	84.7	23.9	0	124.7	108.6	
1855.2	42.8	40.0	29.1	30	41.9	39.1	54.0
2782.8	36.1	34.5	34.8	30	40.9	39.3	54.0
3710.4	30.0	32.3	39.6	30	39.6	41.9	54.0
4638.0	30.3	34.8	44.3	30	44.6	49.1	54.0

Data Antenna Substitution Method for Power Output

Frequency of Emission	Measured Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
904.6	100.5	85.2	28.5	13.3
914.8	102.0	85.3	30.4	13.8
927.6	100.8	84.7	29.5	13.4

Summary of Results for Radiated Emissions of Intentional Radiator

The EUT had a 3.8 dB margin below the limit for the harmonic emissions. The radiated emissions for the EUT meet the requirements for FCC Part 15.247 Intentional Radiators. There are no measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 10 dB below the FCC Limits. The specification of 15.247 are met, there are no deviations or exceptions to the requirements.

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the FCC Part 15C emissions standards. There were no deviations to the specifications.

APPENDIX

Model: CDR915 DATA TRANSMITTER MODULE

1. Test Equipment List
2. Rogers Qualifications
3. FCC Site Approval Letter

TEST EQUIPMENT LIST FOR ROGERS LABS, INC.

The test equipment used is maintained in calibration and good operating condition. Use of this calibrated equipment ensures measurements are traceable to national standards.

List of Test Equipment:	Calibration Date:
Scope: Tektronix 2230	2/05
Wattmeter: Bird 43 with Load Bird 8085	2/05
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140	2/05
H/V Power Supply: Fluke Model: 408B (SN: 573)	2/05
R.F. Generator: HP 606A	2/05
R.F. Generator: HP 8614A	2/05
R.F. Generator: HP 8640B	2/05
Spectrum Analyzer: HP 8562A,	2/05
Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W	
HP Adapters: 11518, 11519, 11520	
Spectrum Analyzer: HP 8591 EM	5/05
Frequency Counter: Leader LDC 825	2/05
Antenna: EMCO Biconilog Model: 3143	5/05
Antenna: EMCO Log Periodic Model: 3147	10/05
Antenna: Antenna Research Biconical Model: BCD 235	10/05
Antenna: EMCO Dipole Set 3121C	2/05
Antenna: C.D. B-101	2/05
Antenna: Solar 9229-1 & 9230-1	2/05
Antenna: EMCO 6509	2/05
Audio Oscillator: H.P. 201CD	2/05
R.F. Power Amp 65W Model: 470-A-1010	2/05
R.F. Power Amp 50W M185- 10-501	2/05
R.F. PreAmp CPPA-102	2/05
LISN 50 µHy/50 ohm/0.1 µf	10/05
LISN Compliance Eng. 240/20	2/05
LISN Fischer Custom Communications FCC-LISN-50-16-2-08	6/05
Peavey Power Amp Model: IPS 801	2/05
Power Amp A.R. Model: 10W 1010M7	2/05
Power Amp EIN Model: A301	2/05
ELGAR Model: 1751	2/05
ELGAR Model: TG 704A-3D	2/05
ESD Test Set 2010i	2/05
Fast Transient Burst Generator Model: EFT/B-101	2/05
Current Probe: Singer CP-105	2/05
Current Probe: Solar 9108-1N	2/05
Field Intensity Meter: EFM-018	2/05
KEYTEK Ecat Surge Generator	2/05
Shielded Room 5 M x 3 M x 3.0 M (101 dB Integrity)	

10/20/2005

QUALIFICATIONS

Of

SCOT D. ROGERS, ENGINEER

ROGERS LABS, INC.

Mr. Rogers has approximately 16 years experience in the field of electronics. Six years working in the automated controls industry and 6 years working with the design, development and testing of radio communications and electronic equipment.

POSITIONS HELD:

Systems Engineer:	A/C Controls Mfg. Co., Inc. 6 Years
Electrical Engineer:	Rogers Consulting Labs, Inc. 5 Years
Electrical Engineer:	Rogers Labs, Inc. Current

EDUCATIONAL BACKGROUND:

1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.

2) Bachelor of Science Degree in Business Administration Kansas State University.

3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.

Scot D Rogers

Scot D. Rogers

January 22, 2006
Date

1/11/03

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

August 15, 2003

Registration Number: 90910

Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053

Attention: Scot Rogers

Re: Measurement facility located at Louisburg
3 & 10 meter site
Date of Renewal: August 15, 2003

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Ms. Phyllis Parrish
Information Technician