FCC EMC TEST REPORT

for

REMOTE POSSIBILITIES, LLC

REMOTE CONTROL TRANSMITTER

Model: RBTX1A

GARWOOD LABORATORIES, INC.

TESTING AND ENGINEERING SERVICES

EMC TEST REPORT

Certification for 47 CFR Part 15
Subpart C / IC RSS-210

Report for:

REMOTE POSSIBILITIES, LLC

REMOTE CONTROL TRANSMITTER

Model: RBTX1A

Prepared For: *Remote Possibilities, LLC*
P.O.Box 4643
Tulsa, Oklahoma 74104

Prepared By: *Garwood Laboratories, Inc*
950 Calle Negocio
San Clemente, CA 92673

Created: *January 6, 2005*

EMC TEST REPORT FOR PROSOFT TECHNOLOGY, INCORPORATED

RESPONSIBLE SIGNATURES

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WRITTEN BY:	REVIEWED BY:	REVIEWED BY:
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DOCUMENT HISTORY

Revision	*Issue Date*	*Affected Page(s)*	*Description Of Modifications*	*Revised By*	*Approved By*
N/C	January 05, 2004		Initial release		

CLIENT INFORMATION	
Purchase Order	20041231-01
Quote Number	200412-072A
EUT Arrival Date	January 05, 2005
Company Name	Remote Possibilities, LLC
Address	P.O. Box 4643
City, State Zip	Tulsa, Oklahoma 74104
Contact Name	Mr. Sam Kimery
Phone	(918) 607-8376

GARWOOD INFORMATION	
EMC Test Laboratory	Garwood Laboratories, Inc.
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Phone	(949) 361-9189
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Test Personnel	*Test Dates*
Mark Jeffrie Lyon – EMC Test Engineer	05 January, 2005

Accreditations:

The Open Area Test Site (OATS) and measurement facilities used to collect the test data are located at Garwood Laboratories, Incorporated test facility in San Clemente, California.

The test facility is recognized, certified, or accredited by the following organizations:

This site has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration Number: 761986; date of expiration: July 9, 2007 and Registration Number: 851168; date of expiration: June 21, 2007. **Garwood Laboratories** is an authorized test laboratory for the DoC process.

NVLAP LAB CODE 200082-0

Garwood Laboratories, Inc. is accredited by the U.S. National Institute Standards Technology under NVLAP as suppliers of test results to the criteria established by ISO/IEC 17025 and ISO 9002. The accreditation is valid through September 22, 2004.

Technology International

Garwood Laboratories, Inc. has been assessed in accordance with ISO 17025 and with ITI's assessment criteria. Based upon this assessment, Technology International (Europe), Ltd. has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC). The scope of the approval was provided on a Schedule of Assessment supplied with a certificate and is available upon request. Certificate Number: 04-057, effective through June 5, 2005, or until the next agreed assessment date.

Industry Canada Industrie Canada

Garwood Laboratories, Inc. is registered by Industry Canada for performance of measurements and complies with RSS 212, Issue 1 (Provisional). Reference IC 5194, Effective through July 20, 2007.

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MEASUREMENT / TECHNICAL REPORT SUMMARY

Type of Authorization	Certification
Applicable FCC/ IC Rules	Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 19 (10-1-03 Edition). The following subparts are applicable to the results in this test report: Part 15, Subpart C – Intentional Radiators §15.249 (a) / RSS-210 6.3 Spurious Radiated Emissions §15.209 (c) Radiated Emissions §15.205 (a)/ RSS-210 6.3 Restricted Bands of Operation §15.31 (e) Voltage Variations §RSS-210 6.1.1 (c) Occupied Bandwidth
Summary of Data	The EUT complied with all the applicable FCC/ IC rules as listed above.

Note: *For the current status of our accreditation to the above standards please visit the Accreditations page on our website.*

1.0 GENERAL INFORMATION

1.1 Product Description

Equipment Under Test:		Remote Control Transmitter
Model Number:		RBTX1A
Serial Number:		N/A
Description:		The Remote Possibilities LLC, Model RBTX1A is a miniature keyfob-style transmitter for controlling the "RRemote Basic" system. By pressing buttons on the elastomeric keypad on the transmitter, the speed and direction of an electric train motor, which is connected to a receiver and motor driver installed in the electric train, can be changed.
Specifications And Requirements	***Length:***	80 mm
	Width:	15 mm
	Height:	30 mm
RF Specifications	***Frequency***	916.5 MHz.
	RF Power	0 dBm / 1 mW
	Modulation	Amplitude Shift Key (ASK)
	Data Signal	9600 Baud data stream with a bit time of 104 uS
Power Requirements	***Operating Voltage***	3.0 VDC lithium coin cell battery
	Current (Amp):	Sleep Mode – 20 uA; Data (Transmit) Mode- 7 mA
EUT Operating Modes to be Tested		The Remote Basic RBTX1A Transmitter was tested in the "Constant Modulation Transmit " mode.

NOTE:

1. For a more detailed feature description, please refer to the manufacturer's specifications or User's Manual.

1.2 Description of Test Modes(s) and Configurations

The **Remote Basic RBTX1A Transmitter** was configured to transmit continuously at maximum power (0 dBm/1mW) at 916.5 MHz with a new internal 3 volt lithium coin cell battery installed.
The EUT was setup in a tabletop configuration and tested in the worst- case emissions configuration. The worst case configuration was determined while performing a radiated prescan in the prescan room, with loop, bicon, and log periodic antennas in both vertical and horizontal polarity. The EUT was positioned on a non -conductive table, in three different orthogonal axes (x, y, and z), 1 meter distance from the test antenna.

1.3 Antenna Requirements

An analysis of the **Remote Basic RBTX1A Transmitter** was performed to determine compliance with Section 15.203 of the Rules. This section requires specific handling and control of antennas used for devices subject to regulations under Intentional Radiator portions of Part 15.

1.3.1 Evaluation Procedure

The structure and application of the **Remote Basic RBTX1A Transmitter** was analyzed with respect to the rules. The antenna for this unit is an internal antenna.

1.3.2 Evaluation Criteria

Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:

(a) Antenna be permanently attached to the unit.

(b) Antenna must use a unique type of connector to attach to the EUT.

(c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

1.3.3 Evaluation Results

The **Remote RBTX1A Transmitter** meets the criteria of this rule by virtue of having an internal antenna permanently attached to the unit.

1.3 Antenna Requirements (continued)

1.3.4 Antenna Specifications:

Antenna Type	Manufacturer	Model Number	Raited Gain (dBi)
Precision Helical	Linx Technologies	JJB-RA	1 dBi

1.4 Description of Support Units

The EUT has been tested as an independent unit with no support equipment required for the test.

1.5 Related Submittal(s) and Grant(s)

None

1.6 Test Methodology

Radiated Emissions, § 15.205, 15.209, 15.249/ RSS-210

The test for unwanted emissions was performed according to the general provisions of ANSI C63.4-2000 (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 spectrum analyzer was used as a measuring meter along with a quasi-peak adapter. A preamplifier was used to increase the sensitivity of the instrument. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. The final reading is then recorded into the computer data recording program, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The quasi-peak measurement was used only for those readings, which are marked accordingly on the data sheets. The effective bandwidth used for the radiated emissions test was according to the frequency measured (200 Hz. for 10kHz.-150 kHz., 9 kHz. for 150 kHz.-30 MHz., 120 kHz. for 30-1000 MHz. And 1 MHz. for 1000 MHz. and above).

While testing for fundamental and harmonics spurious emissions the measurement procedures were the same as for radiated emissions measurements, except that after the peak reading was taken for each frequency, an average reading was also taken. A video bandwidth of 10 Hz. was selected for these readings to meet the requirements of 15.35 (b) for average detection. Being that the fundamental frequency was 916.5 MHz., a peak reading utilizing a quasi-peak detector was selected to meet the requirements of 15.35 (a).

Broadband loop, biconical, log periodic and horn antennas were used as transducers during the measurement. The loop antenna was used from 10 kHz. to 30 MHz., biconical antenna was used from 30 MHz. to 300 MHz., log periodic antenna was used from 300 MHz. to 1 GHz., and the horn antenna was used from 1 GHz. to 9.165 GHz.

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground plane at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of maximum radiation.

b. The EUT was placed 3 meters away from the interference-receiving test antenna, which was mounted on top of a variable-height antenna tower.

c. The antenna are broadband antennas, and their heights were varied from one to four meters above the ground plane to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set to make the measurements.

1.6 Test Methodology
Radiated Emissions, § 15.209,15.249/ RSS-210 (continued)

d. For each suspected emission, the EUT was configured to it's worst case. The antenna was varied in heights
from one to four meters. The rotating table was turned from 0 to 360 degrees to find the maximum emission reading.

e. The field strength of the fundamental frequency and harmonics, up to the 10th harmonic, were measured utilizing Bicon, Log Periodic, and Double Ridge Guide Horn antennas.

2.0 PRODUCT LABELING

2.1 FCC ID Label

All devices authorized under the certification procedures are required to display an identification label showing the FCC Identifier (FCC ID) under which they are authorized.
Example:

FCC ID: MX5-P2222

In addition, the manufacturer (or importer) is responsible for having the compliance label produced, and for having it affixed to each unit that is marketed or imported.

FCC Compliance Label:

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference including interference that may cause undesired operation.

2.2 Location of Label on EUT

As stated in §15.19, the label shall be located in a conspicuous location on the device. When the device is so small or for such use that it is not practicable to place the compliance label on it, the information required should be placed in a prominent location in the instruction manual or pamphlet supplied to the user. Alternatively, the compliance label can be placed on the container in which the device is marketed. However, the FCC identifier must be displayed on the device.

2.3 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 approved by the party responsible for compliance could void the user's authority to operate the equipment.

3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

The EUT was configured for testing in a typical fashion, as a customer would normally use it.

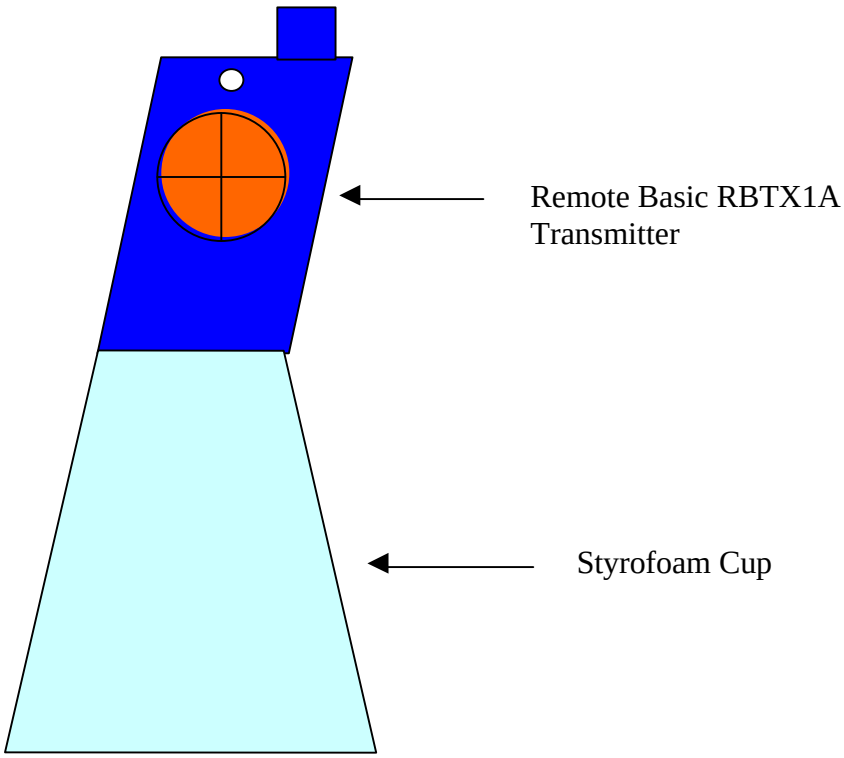
3.2 Special Accessories

The EUT requires no special accessories to comply with the required limits.

3.3 Equipment Modifications

No modifications were made to achieve the required specification limit.

3.4 Configuration of Tested System



4.0 SUMMARY OF TEST RESULTS

4.1 Radiated Emissions

4.1.1 Radiated Emissions Limits

FCC Part 15, Subpart C, § 15.209(a) / RSS-210		
Fundamental frequency	***Field Strength of Fundamental (millivolts/meter)***	***Measurement Distance (meters)***
0.0009-0.490	2400/F(kHz.)	300
0.490-1.705	24000/f(kHz)	30
1.705-30.0	30	500
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBµV/m)= 20 log Emission level (µV/m).
3. As shown in 15.35 (b), for frequencies above 1000 MHz., the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

4.1.2 Field Strength of Emissions from Intentional Radiators Test Results [Reference: FCC PT.15, Subpart C, § 15.209(a) / RSS-210]

4.1.2.1 Field Strength of Emissions Test Results - .01-1000MHz

EUT	Remote Control Transmitter	**MODEL**	RBTX1A
MODE	Continuous Mode	**FREQUENCY RANGE**	.01-1000 MHz.
INPUT POWER	3.0 VDC from internal battery	**DETECTOR FUNCTION**	Quasi-Peak
ENVIRONMENTAL CONDITIONS	23 deg. C, 44% RH	**TESTED BY**	Mark Lyon
PERIPHERALS	N/A		

Frequency (MHz)	*Polarity (V or H)*	*Emission Level (dBµV)*	*CF (dB/m)*	*FCC Radiated Spurious Limit (dBµV/m)*		*Margin (dB)*		*Remarks*
				pk	*ave*	*pk*	*ave*	
210.00	H	6.9	-5.4	43.5	*	-36.6	*	Complied
502.00	V	20.0	3.1	46.0	*	-26.0	*	Complied
675.498	V	33.8	5.6	46.0	*	-12.2	*	Complied
704.330	V	24.8	5.7	46.0	*	-21.2	*	Complied
783.180	V	27.5	8.6	46.0	*	-18.5	*	Complied
848.707	H	23.7	9.6	46.0	*	-22.3	*	Complied

.

Notes:

?? Cells with (*) indicates information not applicable.
?? All readings are quasi- peak with the specified bandwidth unless otherwise stated.
?? No radiated emissions were found below 30 MHz.

4.1.3 Field Strength of Emissions from Intentional Radiators Test Results [Reference: FCC PT.15, Subpart C, § 15.249(a) / RSS-210]

4.1.3.1 Field Strength of Emissions Test Results for 916.5 – 9165.00 MHz.

EUT	Remote Control Transmitter	**MODEL**	RBTX1A
MODE	Continuous Mode	**FREQUENCY RANGE**	916.5- 9165.00 MHz.
INPUT POWER	3.0 VDC from internal battery	**DETECTOR FUNCTION**	Quasi-Peak/ Average
ENVIRONMENTAL CONDITIONS	23 deg. C, 44% RH	**TESTED BY**	Mark Lyon
PERIPHERALS	N/A		

Frequency (MHz)	*Polarity (V or H)*	*CF (dB/m)*	*Emission Level (dBµV/m)*		*FCC Radiated Spurious Limit (dBµV/m)*		*Margin (dB)*		*Remarks*
			pk	*ave*	*pk*	*ave*	*pk*	*ave*	
916.527	V	10.6	87.8	*	94	*	-6.2	*	Fundamental Frequency
916.527	H	10.6	69.2	*	94	*	-24.8	*	Fundamental Frequency
1833.09	V	1.3	42.8	35.7	74	54	-31.2	-18.3	Harmonic
1833.09	H	1.3	44.9	39.6	74	54	-29.1	-14.4	Ambient Noise
2749.00 (R)	V	5.6	32.9	22.5	74	54	-41.1	-31.5	Ambient Noise
2749.00 (R)	H	5.6	33.0	22.5	74	54	-41.1	-31.5	Ambient Noise
3666.00 (R)	V	8.1	34.5	24.3	74	54	-39.5	-29.7	Ambient Noise
3666.00 (R)	H	8.1	35.2	24.3	74	54	-38.8	-29.7	Ambient Noise
4582.50 (R)	V	11.1	38.6	28.2	74	54	-35.4	-25.8	Ambient Noise
4582.50 (R)	H	11.1	39.1	28.2	74	54	-34.9	-25.8	Ambient Noise
5499.00	V	14.1	40.3	30.9	74	54	-33.7	-23.1	Ambient Noise
5499.00	H	14.1	41.2	30.8	74	54	-32.8	-23.2	Ambient Noise

4.1.3.1 Field Strength of Emissions Test Results for 916.5 – 9165.00 MHz. (continued)

EUT	Remote Control Transmitter	**MODEL**	RBTX1A
MODE	Continuous Mode	**FREQUENCY RANGE**	916.5- 9165.00 MHz.
INPUT POWER	3.0 VDC from internal battery	**DETECTOR FUNCTION**	Quasi-Peak/ Average
ENVIRONMENTAL CONDITIONS	23 deg. C, 44% RH	**TESTED BY**	Mark Lyon
PERIPHERALS	N/A		

Frequency (MHz)	*Polarity (V or H)*	*CF (dB/m)*	*Corrected Reading (dBµV/m)*		*FCC Radiated Spurious Limit (dBµV/m)*		*Margin (dB)*		*Remarks*
			pk	*ave*	*pk*	*ave*	*pk*	*ave*	
6415.50	V	17.1	50.1	39.5	74	54	-23.8	-14.5	Ambient Noise
6415.50	H	17.1	49.9	39.4	74	54	-24.1	-14.6	Ambient Noise
7332.00 (R)	V	19.0	50.7	40.9	74	54	-23.3	-13.1	Ambient Noise
7332.00 (R)	H	19.0	52.2	40.9	74	54	-21.8	-13.1	Ambient Noise
8248.00 (R)	V	19.7	51.5	41.3	74	54	-22.5	-12.7	Ambient Noise
8248.00 (R)	H	19.7	52.1	41.2	74	54	-21.9	-12.8	Ambient Noise
9165.00 (R)	V	20.8	52.4	42.3	74	54	-22.3	-10.9	Ambient Noise
9165.00 (R)	H	20.8	51.9	42.1	74	54	-22.5	-10.6	Ambient Noise

.

Notes:

?? (R) Indicates frequency in restricted band as defined in 15.205.

?? Measurements 30 – 1000 MHz. were performed using spectrum analyzer with quasi peak detector.

?? Measurements above 1.0 GHz. were performed using spectrum analyzer in peak hold mode. Average measurements were performed on spurious emissions exceeding the average limit, when measured in peak hold mode.

4.1.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG

Where: FS = Field strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier gain

Example:

Assume a receiver reading of 52.5 dB?V is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dB?V/m.

FS = 52.5 + 7.4 + 1.1 – 29 = 32 dB?V/m

4.1.5 Test Site

The Radiated Spurious Emissions measurements were performed at the following test location:

Garwood Laboratories, Inc.
San Clemente, California
OATS Site # 2

Testing was performed at a test distance of:

3 meters

4.1.6 Field Strength of Emissions from Intentional Radiators Test Equipment:

Instrument	*MFG / Model No.*	*Serial Number*	*Calibration Due Date*
Radiated Emissions Test			
Spectrum Analyzer	Hewlett Packard/8566B	2427A04639	4/07/05
Analyzer Display	Hewlett Packard/85662A	2848A17070	2/26/05
Pre-Amplifier	Hewlett Packard/8447A	2805A03163	2/26/05
Active Loop	EMCO/6502	8905-2340	5/10/05
Log Periodical Antenna	A. H. Systems/SAS-200-512	116	5/10/05
Horn Antenna	A. H. Systems/SAS-200/571	145	5/10/05
900 MHz. High Pass Filter	Sage	008	NCR

4.2 Occupied Bandwidth

Where indicated, the 20 dB bandwidth is measured at the points when the spectral density of the signal is or 20 dB down from the inband spectral density of the modulated signal, with the transmitter modulated by a representative signal. The 20 dB bandwidth measurement is an alternative to the 99% emission bandwidth as specified in RSS-210, section 5.9.1.

4.2.1 EUT Operating Conditions:

The software provided by client enabled the EUT to operate continuously in transmit mode.

4.2.2 Occupied Bandwidth Test Summary

Temperature: 24 C Relative Humidity: 28%

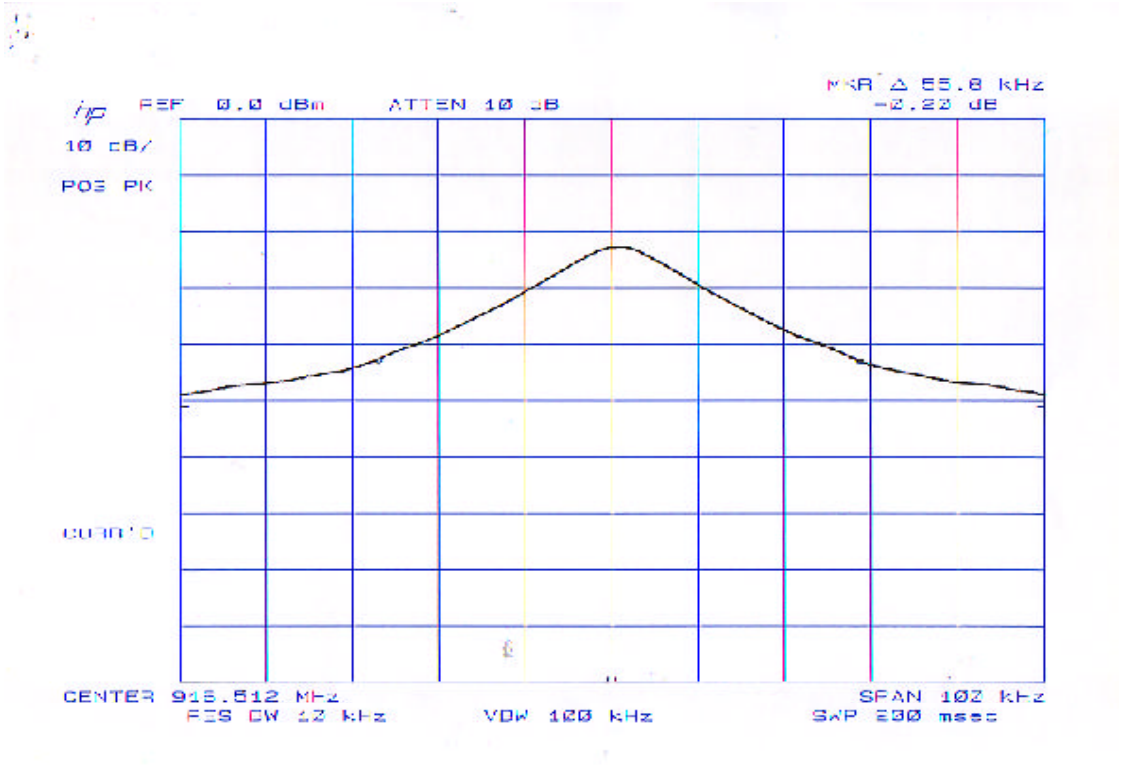
CHANNEL FREQUENCY (MHz.)	20 dB BANDWIDTH (kHz.)
916.512	55.8

Test Personnel:	*- Mark J. Lyon*

Temperature: 24 C Relative Humidity: 28%

4.2.3 Occupied Bandwidth Test Data

Plot 1



APPENDIX A - TEST EQUIPMENT SUMMARY

The absolute performance calibration of equipment requiring calibration is performed on an as needed basis in accordance with ANSI/NCSL Z540-1-1994. However, calibration periods do not exceed one (1) year. The test equipment is capable of making measurements within tolerances of at least +/- 2dB amplitude and +/- 2% frequency deviation. Equipment certifications showing traceability to NIST (National Institute of Standards and Technology) are maintained on file at Garwood Laboratories, Inc. Sam Clemente, California. All equipment is checked and verified for proper operation before and after each series of tests.

APPENDIX B – PHOTOGRAPHS OF THE TEST CONFIGURATION

Radiated Emissions with Active Loop Antenna

Radiated Emissions with Bicon Antenna

Radiated Emissions with Log Periodic Antenna

Radiated Emissions with Horn Antenna

Radiated Emissions Test Setup

APPENDIX C – ATTACHMENTS

INDEX OF ATTACHMENTS