Exhibit B – Test Report

Bluespan LLC

ionKids ionKids Base Station Transmitter

Project Number: 04221-10

Prepared for:
BLUESPAN LLC
802 Cornell Drive
Pflugerville, TX

By

Professional Testing (EMI), Inc.
1601 FM 1460, Suite B
Round Rock, Texas 78664

November 2003

CERTIFICATION
Electromagnetic Interference
Test Report

BLUESPAN LLC
IONKIDS BASE STATION TRANSMITTER

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THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF PROFESSIONAL TESTING (EMI), INC.

Certificate of Compliance

Applicant:	Bluespan LLC
Applicant's Address:	802 Cornell Drive Pflugerville, TX
Model:	ionKids Base Station Transmitter
Project Number:	04221-10
FCC ID:	RLN895662

The **Bluespan LLC ionKids Base Station Transmitter** was tested to and found to be in compliance with FCC Part 15.203, 15.209, and 15.247 for Intentional Radiators.

The highest average emissions generated by the above equipments are listed below:

	Frequency (MHz)	Level (Watts)	Limit (Watts)
Fundamental	915.156	0.0061	1

I, Jeffrey A. Lenk, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures have reviewed the test setup, measured data and this report. I believe them to be true and accurate.

Jeffrey A. Lenk
President

1.0 EUT Description

The Equipment Under Test (EUT) is the **Bluespan LLC, ionKids Base Station Transmitter**. The base unit is a wallet sized flip-top transceiver. It has a LCD display and is powered by a rechargeable lithium ion battery. The Base unit's function is to alert and directionally find a child wearing the associated wrist tag. It has two antennas, an omni directional antenna for alerting the wrist tag to status, and a directional antenna used for radio locating.

The EUT is a frequency hopping transmitter. There are 50 hopping frequencies, selected in a random but predetermined order. The average time of occupancy per channel is 15 ms.
The average channel spacing is 280 kHz.

The EUT transmits at the frequency of 902-928 MHz and is designed for compliance with 47 CFR 15.247 of the FCC rules. Specific test requirements for the device include the following:

47 CFR 15.247 Operational requirements for frequency hopping systems
47 CFR 15.209 Spurious Radiated Emission Limits
47 CFR 15.203 Antenna Requirements

The transmitter operates within the frequency of 902 to 928 MHz. It is a frequency hopping system. As per FCC 47 CFR 15.247, the EUT is limited to operate in bandwidths separated by a minimum of 25 KHz or 20 dB bandwidth of the hopping channel whichever is greater. Each frequency must be used equally on the average by the transmitter.

For the EUT**,** if the 20 dB bandwidth of the hopping channel is less than 250 KHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be grerater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 KHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

The system tested consisted of the following:

Manufacturer & Model	Serial #	FCC ID #	Description
Bluespan LLC ionKids Base Station Transmitter	None	RLN895662	Hand held device for tracking a companion wrist-tag

System Peripherals
None.

1.1 EUT Operation

The EUT was set to transmit at a single frequency for an indefinite period. The EUT has two antennas and therefore, transmit emissions were measured from each antenna in turn. The position of the EUT on the turntable was varied in three axes to find the maximum signal strength. The position of the flip top was also varied to maximize the emissions.

2.0 Electromagnetic Emissions Testing

Professional Testing (EMI), Inc. (PTI), follows the guidelines of NIST for all uncertainty calculations, estimates and expressions thereof for EMC testing. A copy of PTI's policy for EMC Measurement Uncertainty is provided in Appendix C.

2.1 Radiated Emissions Measurements

Radiated emission measurements were made on transmitter Fundamental emissions generated by the **Bluespan LLC ionKids Base Station Transmitter**. The fundamental was measured to prove that the internal antenna gain was less than 6 dBi. (Antenna Gain is: EIRP – P = 13.2 – 8 = 5.2 dB)

Measurements of the maximum emission levels for the fundamental emissions of the transmitter were made at the Professional Testing "Open Field" Site 3, located in Round Rock, Texas. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of CFR 47 of the FCC rules.

Tests of the fundamental for the device were performed to determine the worst case orientation and polarization of the device.

2.1.1 Test Procedure

The following testing procedure was applied to the EUT mentioned above.

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable, which allows 360-degree rotation. For measurements of the fundamental signal, a measurement antenna was positioned at a distance of 3 meters as measured from the closest point of the EUT. The radiated emissions were maximized by placing the EUT in all three orthogonal positions and by rotating the table and by scanning the receive antenna height.

A Spectrum Analyzer with peak detection was used to find the maximums of the radiated emissions during the variability testing. A drawing showing the test setup is given as Figure 1.

2.1.2 Test Criteria

For frequency hopping systems, the following limits are used as per 15.247.

For systems operating in the 902-928 MHz bandwidth

- 1 watt for systems using 50 or more hopping channels, which is applicable in the case of the EUT.

In addition to these requirements, the EUT must meet the restricted emission band requirements of §15.205 and §15.209.

2.1.3 Test Results

The radiated test data for the fundamental is included in Appendix A. Bandwidth Measurement data is in Appendix B. The emissions were maximized at each frequency and the highest emissions identified were measured using peak detection. The spurious radiated emissions generated by the Bluespan LLC ionKids Base Station Transmitter are below the FCC Part 15 maximum emission criteria.

Power measurements were made at the antenna terminals and found to be 8 dBm or 6.3 mW. This is much less than the 1 watt limit.

3.0 Antenna Requirement

An analysis of the **Bluespan LLC ionKids Base Station 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 the Intentional Radiator portions of Part 15.

3.1 Evaluation Procedure

The structure and application of the **Bluespan LLC, ionKids Base Station Transmitter** were analyzed with respect to the rules. Both the antennas for this unit are internal antennas permanently attached to the EUT. An auxiliary antenna port is not present.

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.

3.3 Evaluation Results

The **Bluespan LLC ionKids Base Station Transmitter** meets the criteria of this rule by virtue of having internal antennas located inside the enclosure. There is no means of relocating the antennas externally. The EUT is therefore compliant with §15.203.

4.0 Receiver Portion

The **Bluespan LLC, ionKids Base Station Transmitter – Receiver Portion** was tested and found to be in compliance with FCC Part 15 for Receivers and for Class B Digital Devices.

The Receiver portion was verified for compliance with 47 CFR 15.109 of the FCC rules. Radiated emission measurements were made on the emission levels generated by the Receiver portion of the **Bluespan LLC ionKids Base Station Transmitter** and were found to be below the FCC Part 15.109 maximum emission criteria. A DoC has been prepared for the receiver portion.

5.0 Modifications to Equipment

The following modification was made to the **Bluespan LLC ionKids Base Station Transmitter** during the testing process.

- A 3 pF capacitor was added between pins 4 and 5 of the CC1000 Chip.

6.0 RF Safety

The FCC safety criteria that invokes measurement of specific absorption rate (SAR), from OET Bulletin 65 Supplement C, is 300 mW for 915 MHz operating frequency. There are three different limit calculations required for compliance.

1. Absorption must be less than 0.08 W/kg averaged over the whole body.
Calculation:
-Assume all of the energy radiated is absorbed by the body.
-Assume the body is 1kg or greater mass.
The absorption rate would be 6mW/kg or less, which is less than the limit of 80mW/kg.

2. Absorption must be less than 1.6W/kg averaged over any one gram, where the one gram is in the shape of a cube, except the hands, wrists, feet and ankles.

-Assume product is held in hand.
-Assume product is held 20cm from the body and head.
-Assume product radiates isotropically at 21mW EIRP.
-Assume body or head density is near that of water, so that one gram has dimensions approximately 1cm cubed. The power density 20cm away from the source is 6.3mW/(4*pi*r^2) = 6.3mW/5024cm^2 = 1.25uW/g =1.25mW/kg which is much less than the limit of 1.6W/kg.

3. Absorption must be less than 4W/kg averaged over any 10 grams for the hands, wrists, feet, and ankles. The 10 grams is in the shape of a cube.

-Assume that the unit is held in the hand, and that half of the radiance is absorbed by 10 grams in the hand.
-Assume that the remaining energy escapes into the atmosphere. Half of the power is 3.13mW. 3.13mW/10g = 3.13mW/kg, which is less than 4W/kg.

Therefore, the output of this transmitter meets the requirements of FCC rules 2.1091 & 2.1093.

7.0 Maximum Permissible Exposure (MPE) Evaluation

MPE was evaluated at a distance of 20cm. At a 20cm distance, the surface area of a sphere is 4*pi*r^2 = 5024cm^2. Assuming isotropic distribution of the emissions, the power density would be evenly distributed. We can then find the power density by dividing the power by the area which would amount to 6.3mW/5024cm^2 = 1.25 uW/cm^2, which is much less than the limit.

The limit for exposure from 1.1310 is f/1500 = 928/1500 mW/cm^2 = 618.6 uW, which is much greater than the emission.

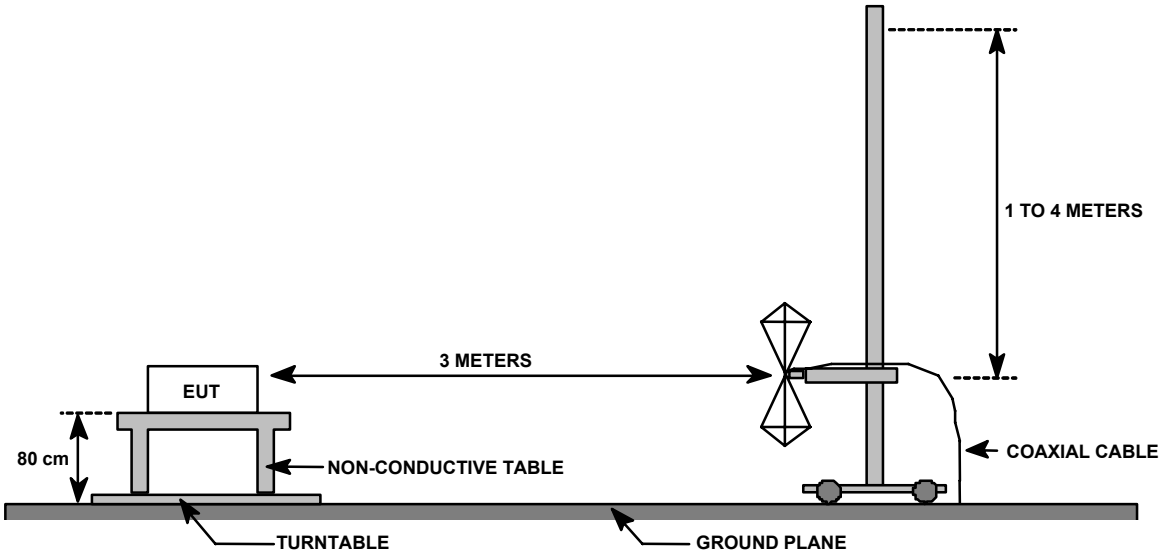
8.0 List of Test Equipment

A list of the test equipment utilized to perform the testing is given below. The date of calibration is given for each.

Electromagnetic Emissions Test Equipment

Model	Description	Calibration Due
HP 85662A	Display Unit	November 2004
HP 85650A	Quasi-Peak Adapter	November 2004
EMC 3115	Ridge Guide Antenna	June 2004
MITEQ	20 GHz Preamplifier	December 2004
HP8566B	Spectrum Analyzer	November 2004
Tektronix 2706	RF Preselector	December 2004
HP 8447D	Preamplifier	November 2004
Compliance Design B-100	Biconical Antenna	December 2004
EMCO 3146	Log Periodic Antenna	December 2004

FIGURE 1: Radiated Emissions Test Setup


1 TO 4 METERS
3 METERS
EUT
80 cm
NON-CONDUCTIVE TABLE
COAXIAL CABLE
TURNTABLE
GROUND PLANE

Appendix A Emissions Data Sheets

Fundamental Radiated Data Sheet
Bluespan LLC
ionKids Base Station Transmitter

DATE: October 20, 2003
PROJECT #: 04221-10
Mode: Transmit continuously with directional antenna

DETECTOR FUNCTION: Peak
MEASUREMENT DISTANCE (m): 3

Antenna Polarization: Horizontal

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)
915.156	180	1	69.9	0.0	25.2	9.0	104.1
915.156	20	1	69	0.0	25.2	9.0	103.2
915.156	330	2	71.6	0.0	25.2	9.0	105.8

Antenna Polarization: Vertical

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)
915.156	180	1	58.3	0.0	25.2	9.0	92.5
915.156	70	1	74.2	0.0	25.2	9.0	108.4
915.156	80	1	66.6	0.0	25.2	9.0	100.8

Corrected Level = Recorded Level - Amplifier Gain + Antenna Factor + Cable Loss

Comment: No other signals were detected within 10 dB of the general limit, 30MHz to 1GHz

Test Engineer: Mike Royer

Fundamental Radiated Data Sheet
Bluespan LLC
ionKids Base Station Transmitter

DATE: October 20, 2003
PROJECT #: 04221-10
Mode: Transmit continuously with omni-directional antenna

DETECTOR FUNCTION: Peak
MEASUREMENT DISTANCE (m): 3

Antenna Polarization: Horizontal

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)
915.156	30	2	62.3	0.0	25.2	9.0	96.5
915.156	270	1	69.7	0.0	25.2	9.0	103.9
915.156	100	1	59.2	0.0	25.2	9.0	93.4

Antenna Polarization: Vertical

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)
915.156	170	1.2	60.3	0.0	25.2	9.0	94.5
915.156	100	1.1	57.7	0.0	25.2	9.0	91.9
915.156	180	1	67.4	0.0	25.2	9.0	101.6

Corrected Level = Recorded Level - Amplifier Gain + Antenna Factor + Cable Loss

Comment: No other signals were detected within 10 dB of the general limit, 30MHz to 1GHz

Test Engineer: Mike Royer

Microwave Radiated Data Sheet
Bluespan LLC
ionKids Base Station Transmitter

DATE: October 31, 2003
PROJECT #: 04221-10
Mode: Transmit with omni-directional antenna

DETECTOR FUNCTION: Peak
MEASUREMENT DISTANCE (m): 1

Antenna Polarization: Horizontal

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/M)	Cable Loss (dB)	Corrected Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)
1830	max	1	61.2	22.9	26.8	2.4	67.5		
2745	max	1	44.9	22.6	29.5	3.0	54.8	63.5	-8.7
3660	max	1	42	22.9	32.1	3.6	54.8	63.5	-8.7
4575	max	1	41.1	23.2	33.5	4.1	55.5	63.5	-8.0
5490	max	1	33.6	23.0	35.0	4.4	50.0		
6405	noise	Floor	19	22.2	35.1	5.2	37.2		
7320	noise	Floor	19	21.3	36.9	5.4	39.9	63.5	-23.6
8235	noise	Floor	19	21.2	37.5	5.3	40.7		
9150	noise	Floor	19	21.1	37.4	5.7	41.0	63.5	-22.5

Antenna Polarization: Vertical

Freq. (MHz)	EUT Dir (Deg.)	Antenna Elevation (Meters)	Recorded Level (dBuV)	Amplifier Gain (dB)	Antenna Factor (dB/M)	Cable Loss (dB)	Corrected Level (dBuV/M)	Limit (dBuV/M)	Margin (dB)
1830			62.4	22.9	26.8	2.4	68.7		
2745			51.5	22.6	29.5	3.0	61.4	63.5	-2.1
3660			48.6	22.9	32.1	3.6	61.4	63.5	-2.1
4575			41.8	23.2	33.5	4.1	56.2	63.5	-7.3
5490			41.9	23.0	35.0	4.4	58.3		
6405	noise	floor	19	22.2	35.1	5.2	37.2		
7320	noise	floor	19	21.3	36.9	5.4	39.9	63.5	-23.6
8235	noise	floor	19	21.2	37.5	5.3	40.7		
9150	noise	floor	19	21.1	37.4	5.7	41.0	63.5	-22.5

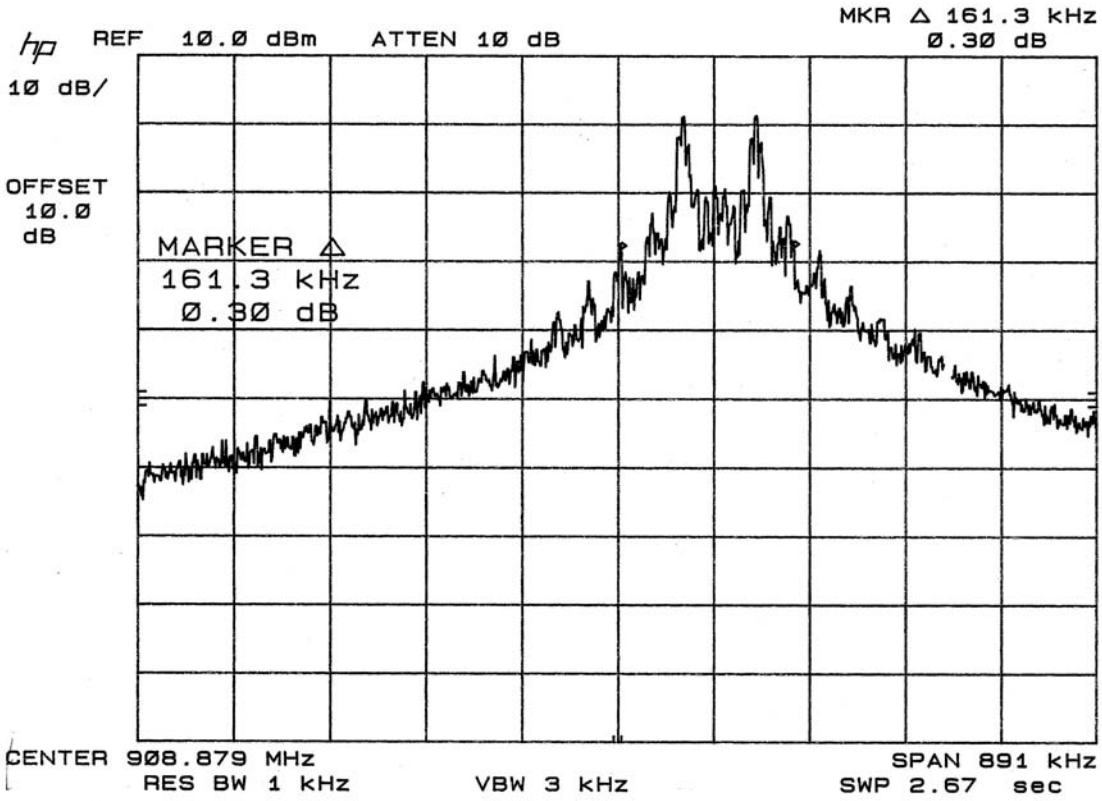
Corrected Level = Recorded Level - Amplifier Gain + Antenna Factor + Cable Loss

Comment: No signals within 20 dB of the strongest fundamental transmission were found outside of the 902-928 MHz band, from 30 MHz to 9.29 GHz.

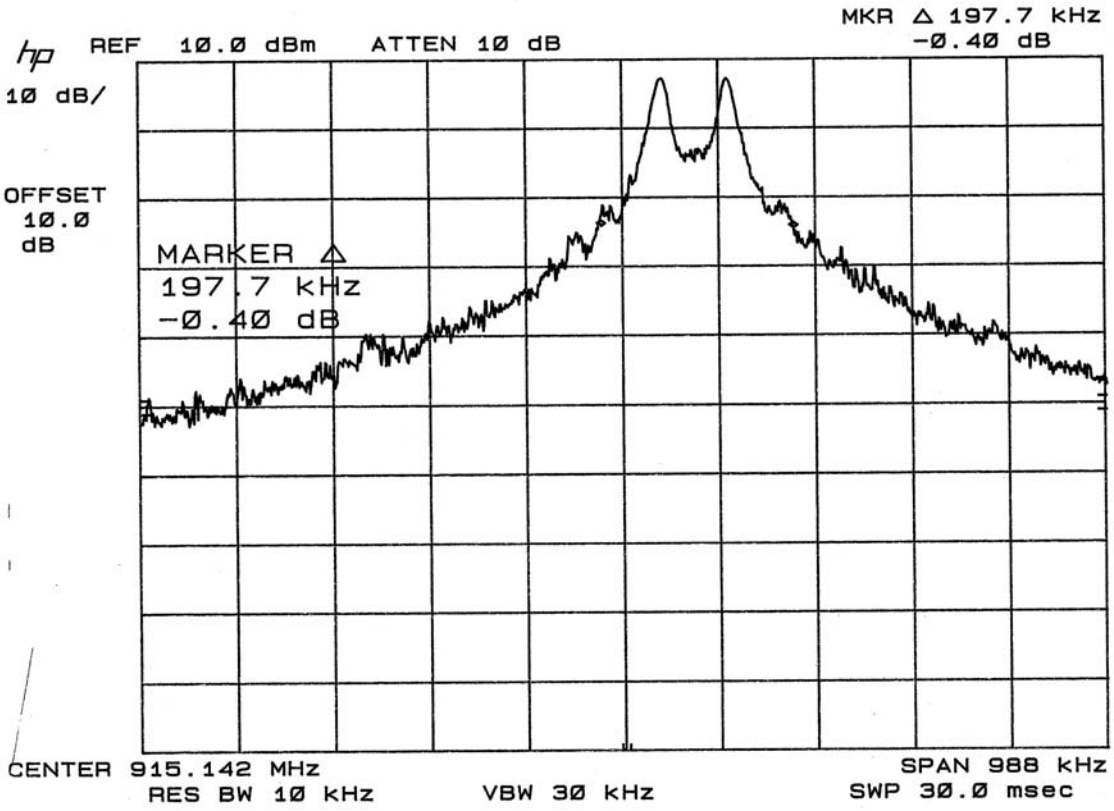
Test Engineer: Mike Royer

Appendix B Bandwidth Data

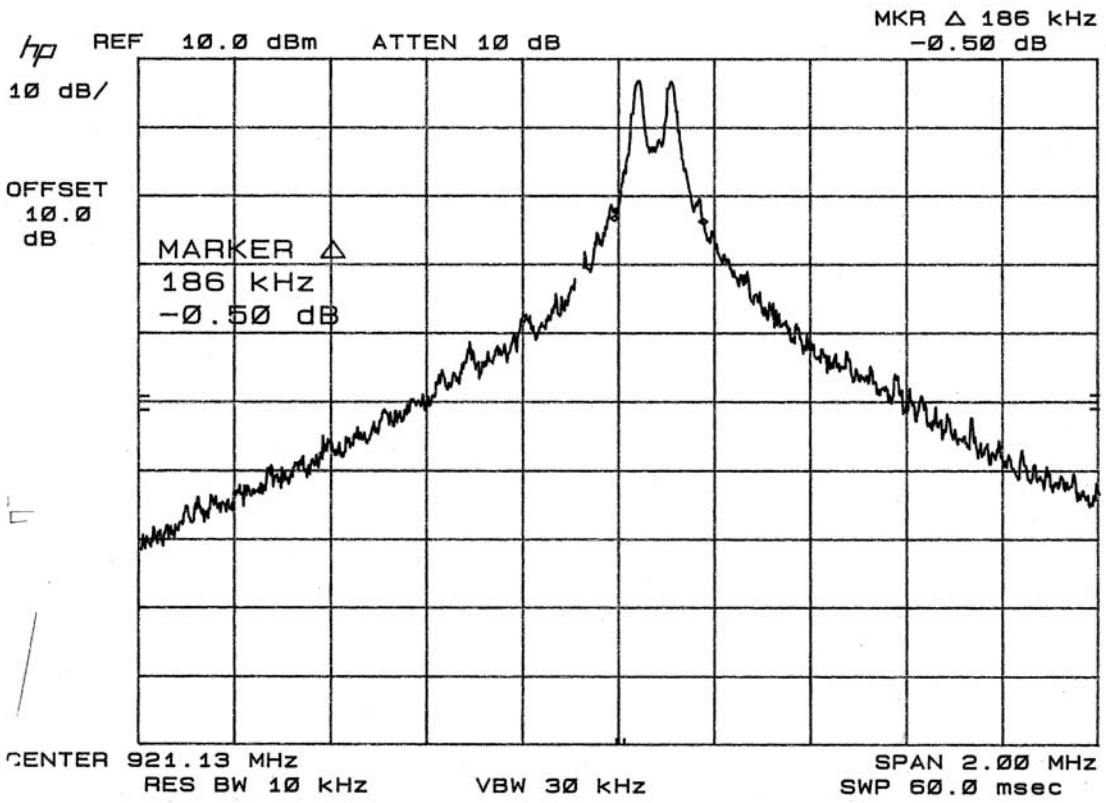
Occupied Bandwidth for Lowest Channel



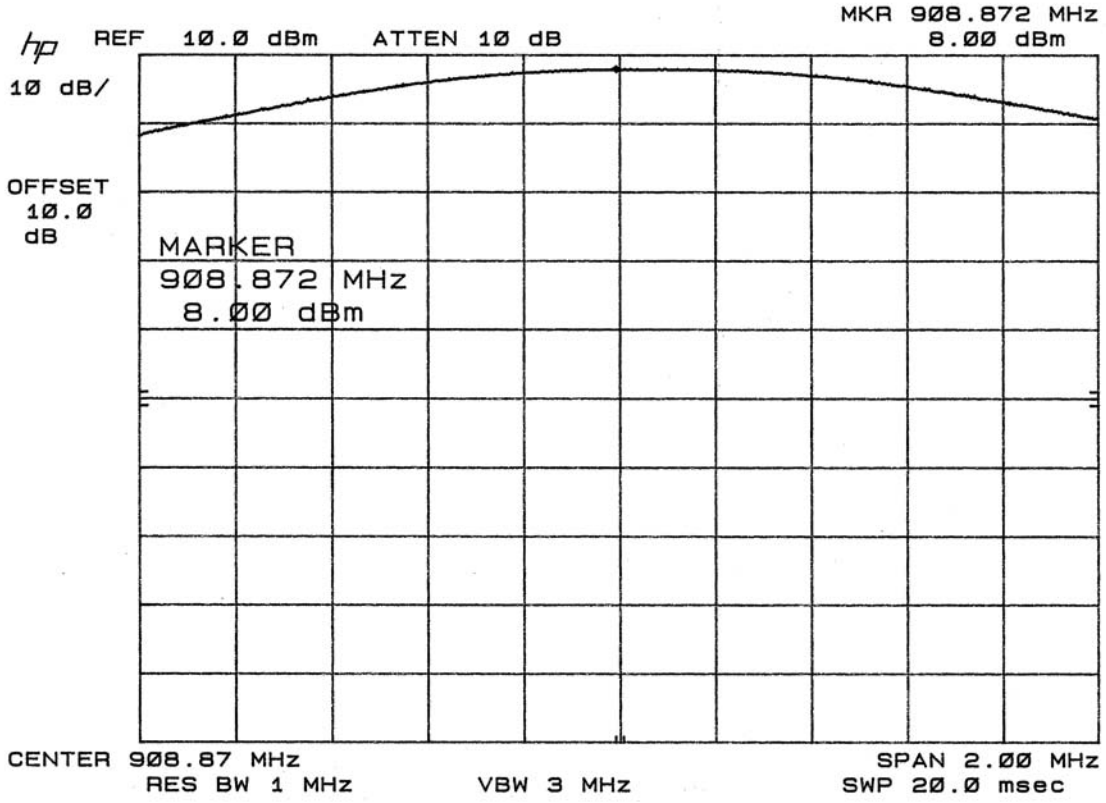
Occupied Bandwidth for Middle Frequencies



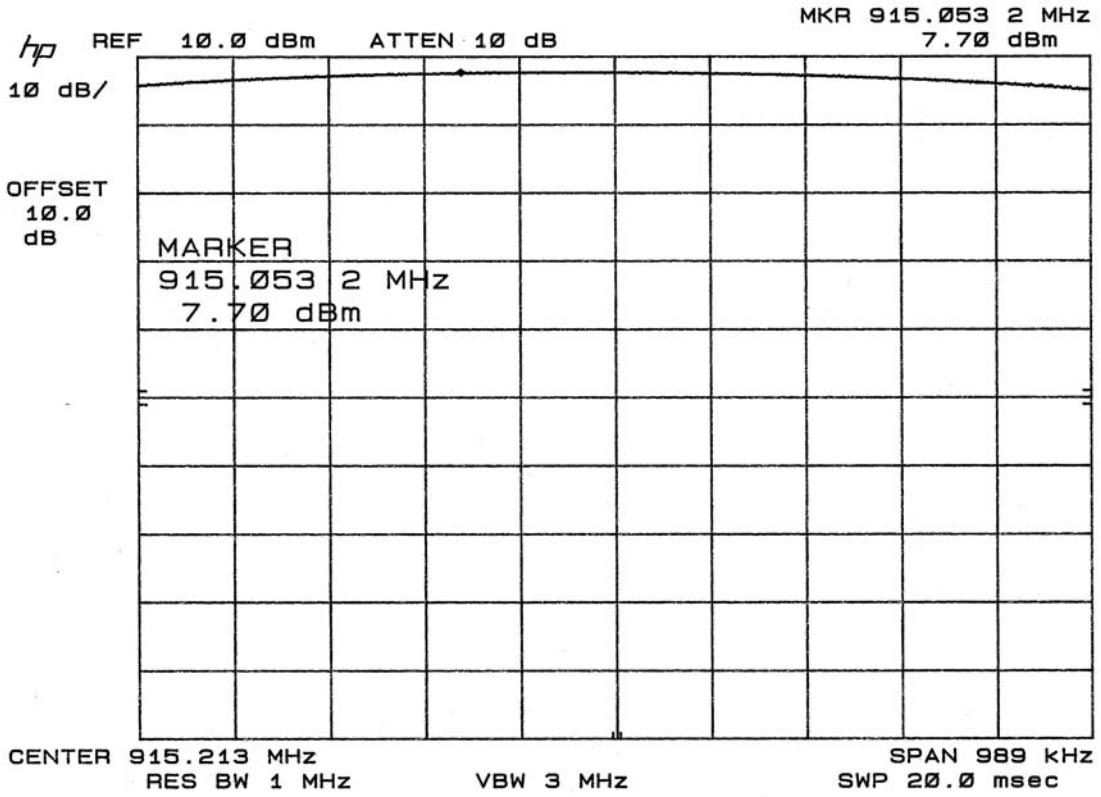
Occupied Bandwidth for Highest Channel



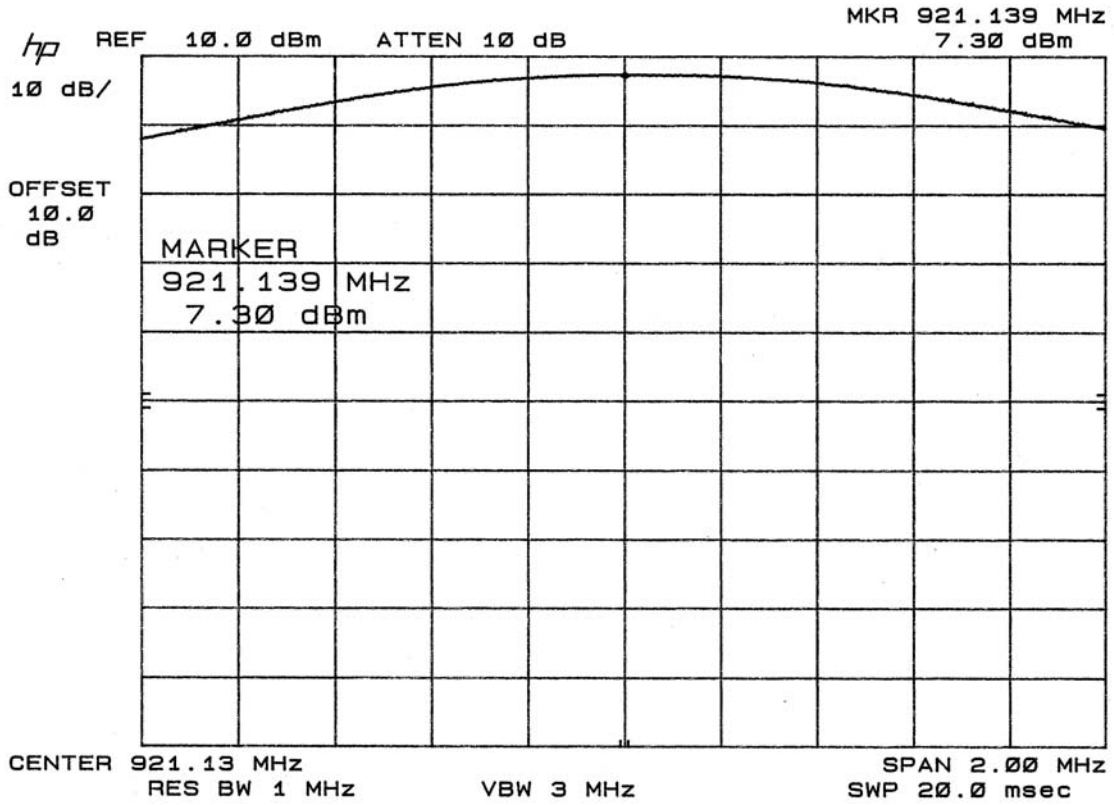
Peak Power on Lowest Channel



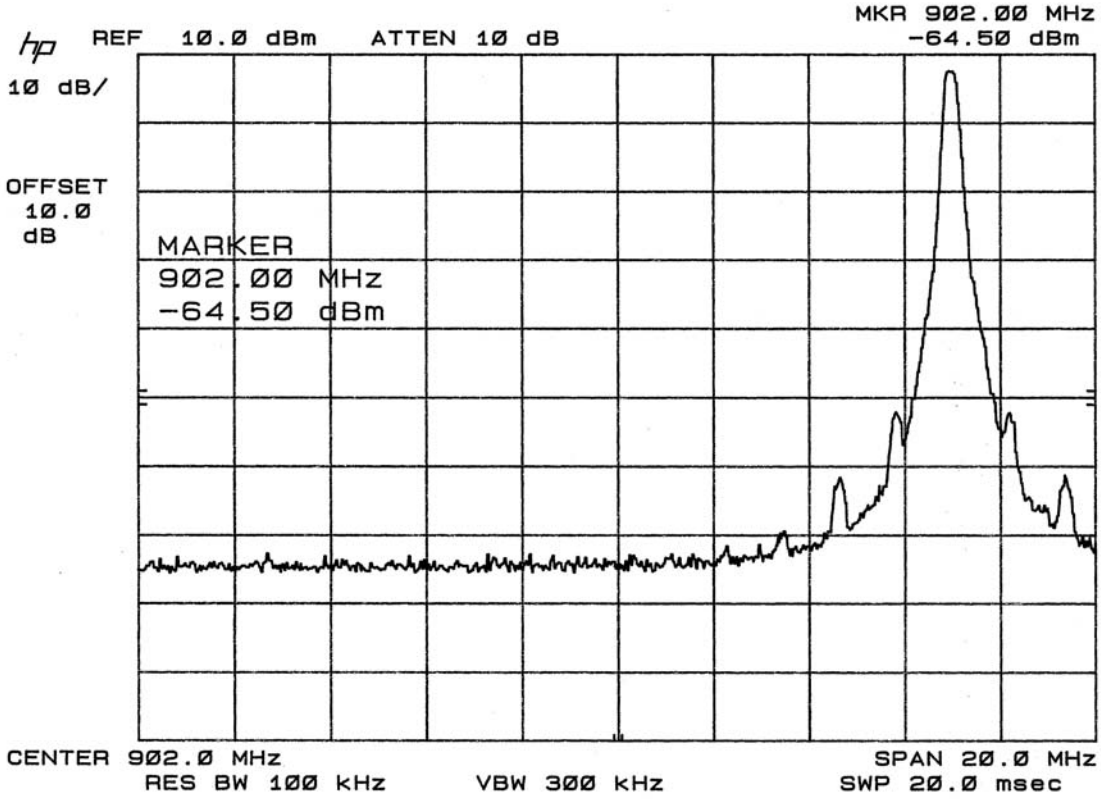
Peak Power on Middle Frequencies



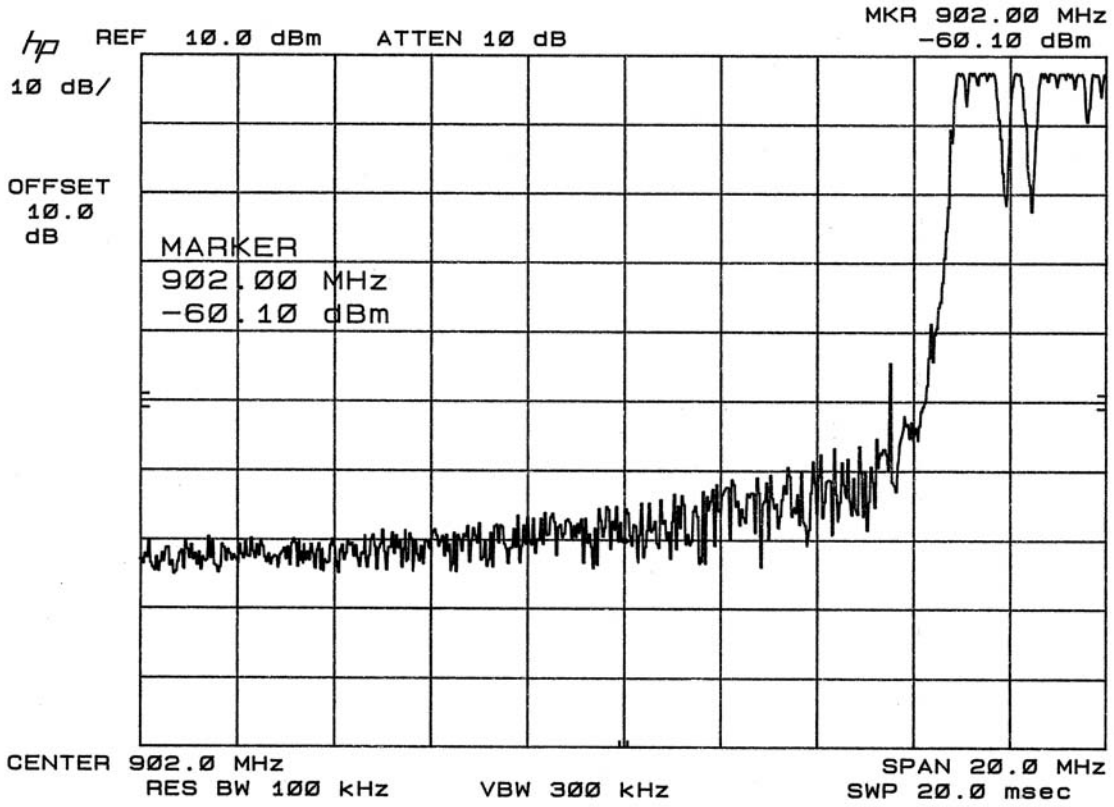
Peak Power on Highest Channel



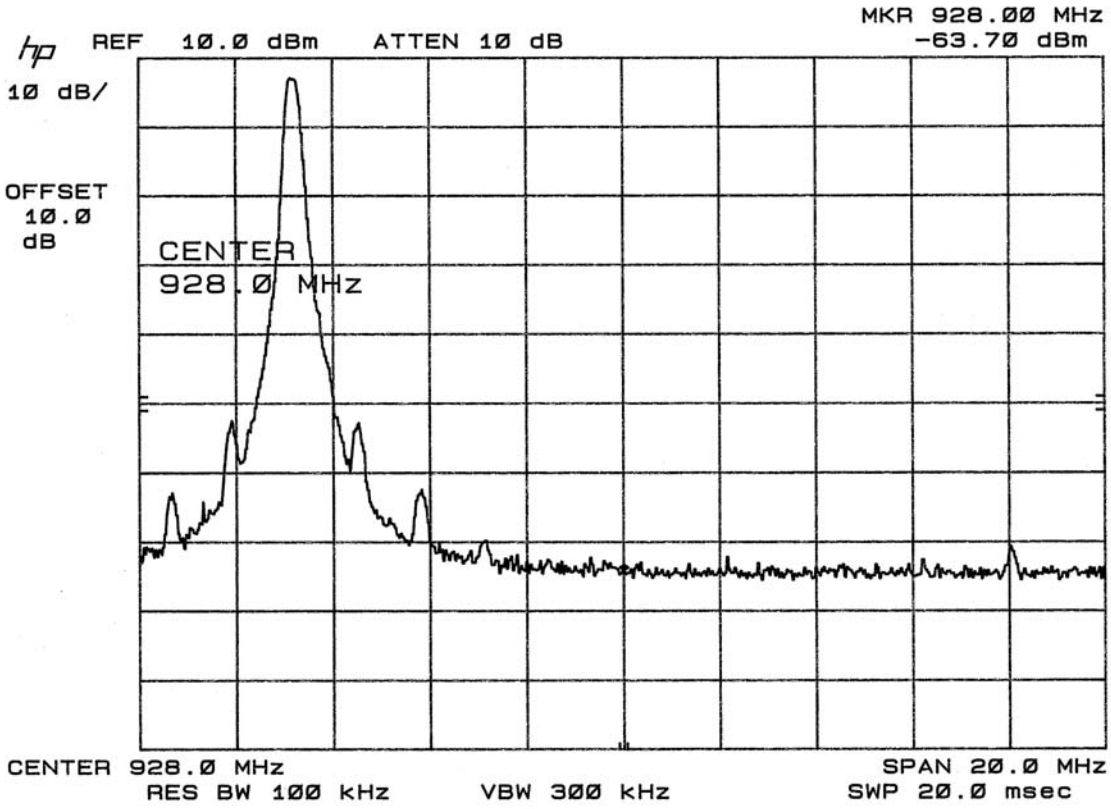
Band Edge – Low Frequency– Hopping Stopped



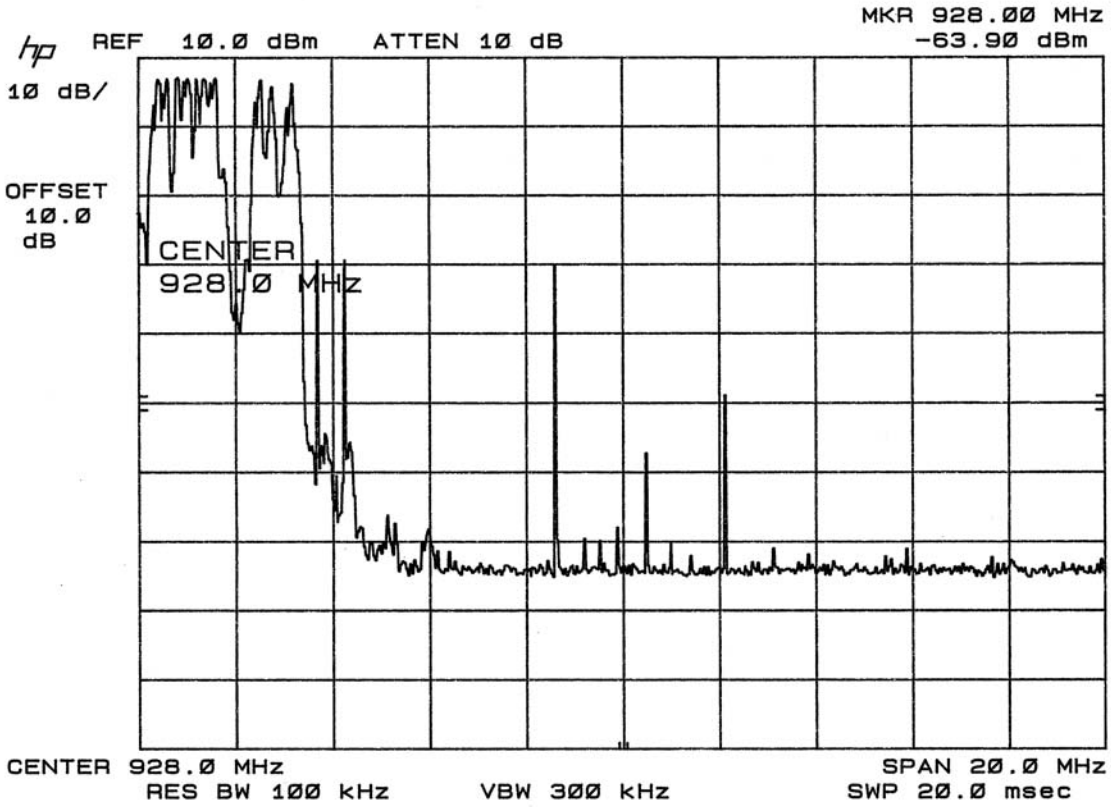
Band Edge – Low Frequency– Hopping Enabled



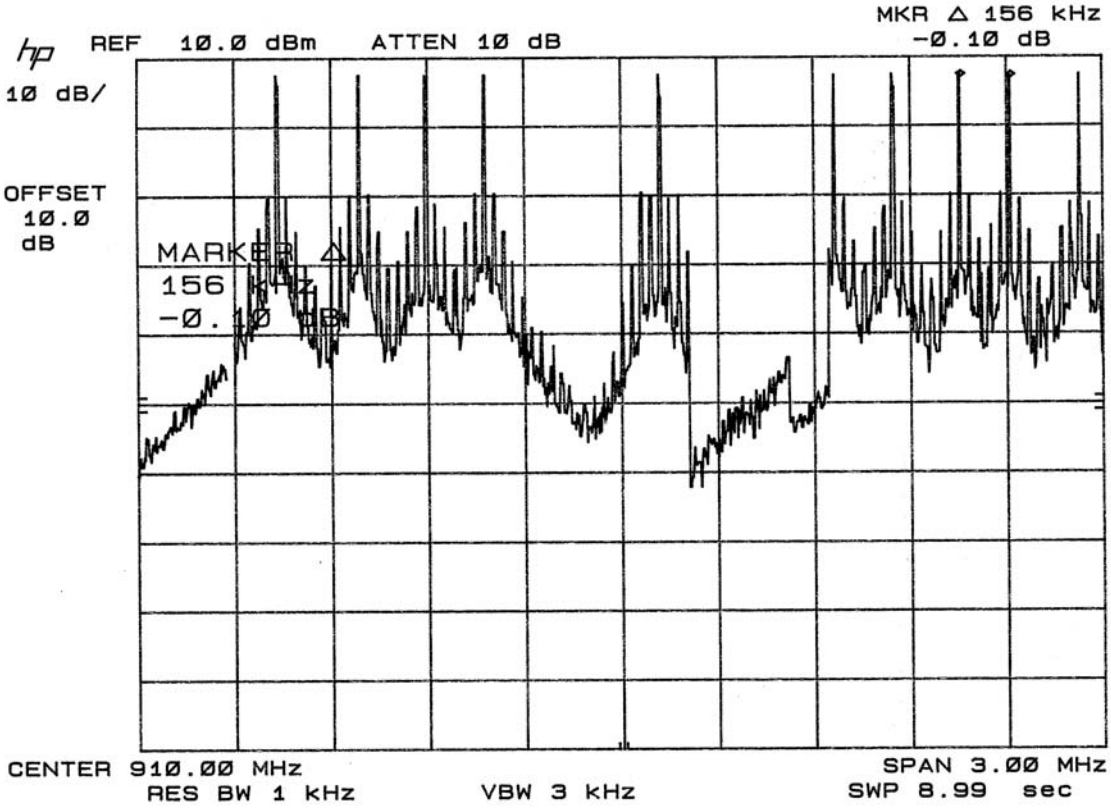
Band Edge – High Frequency – Hopping Stopped



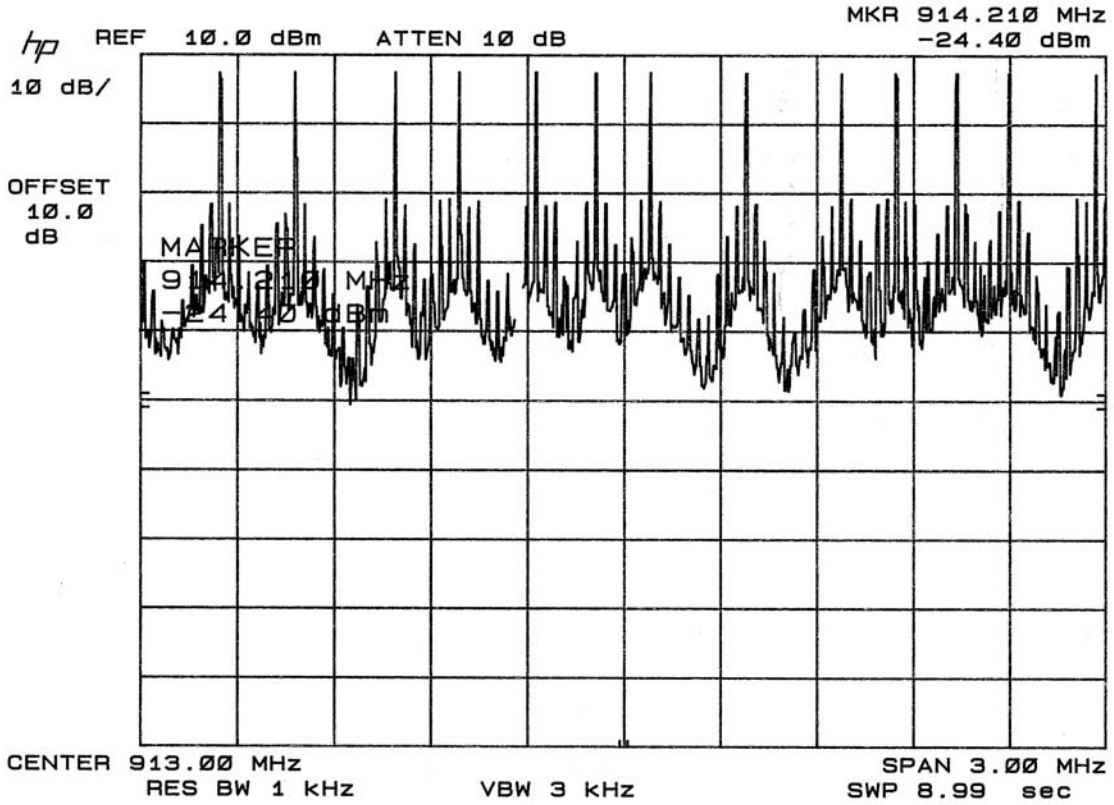
Band Edge Compliance – Upper Frequency Hopping Enabled



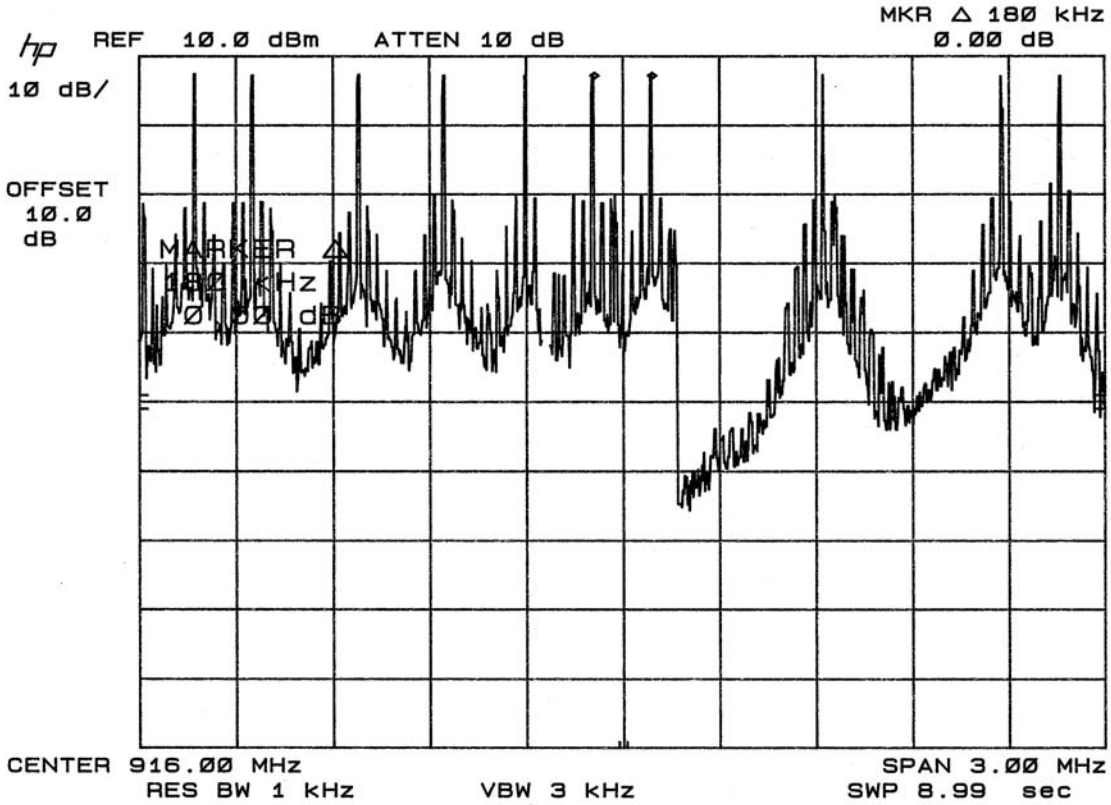
Channel Spacing



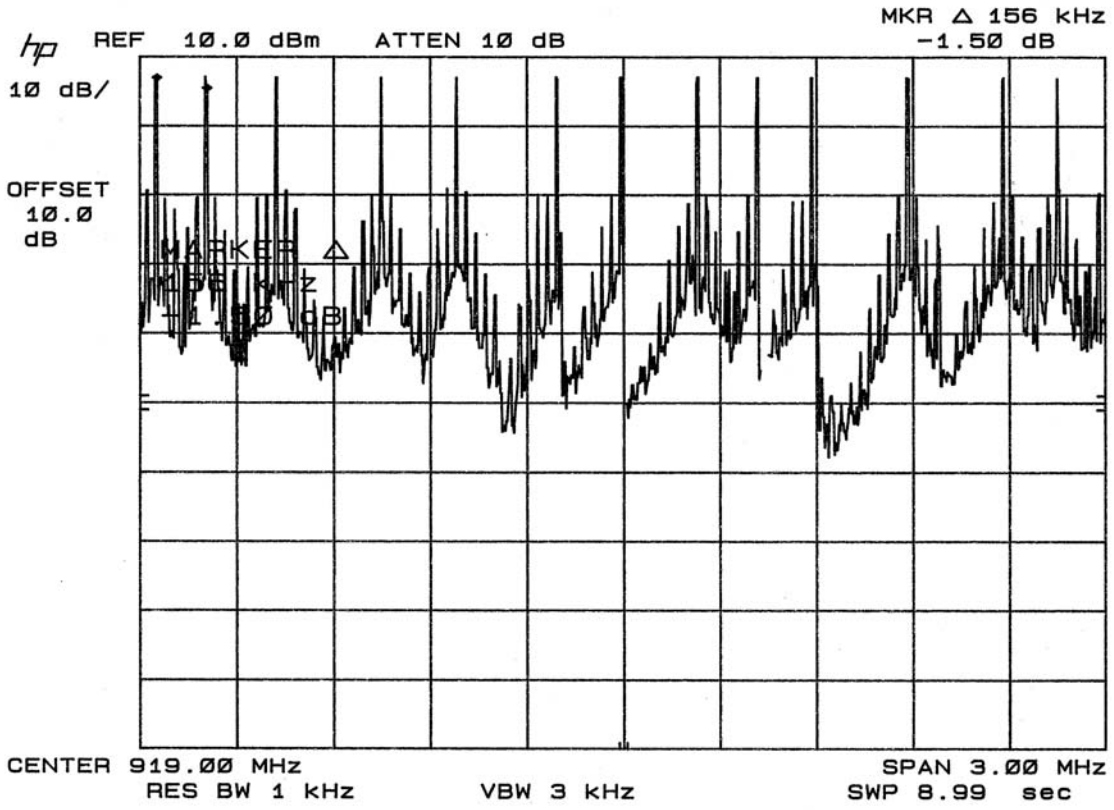
Channel Spacing



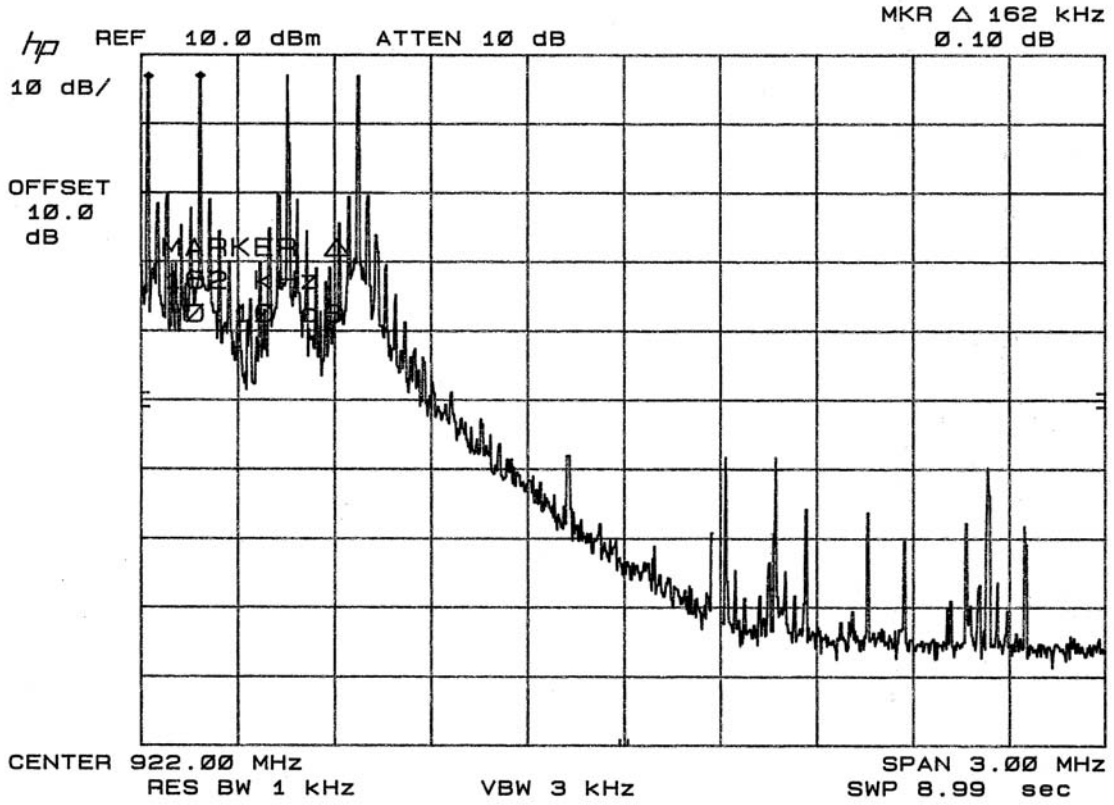
Channel Spacing



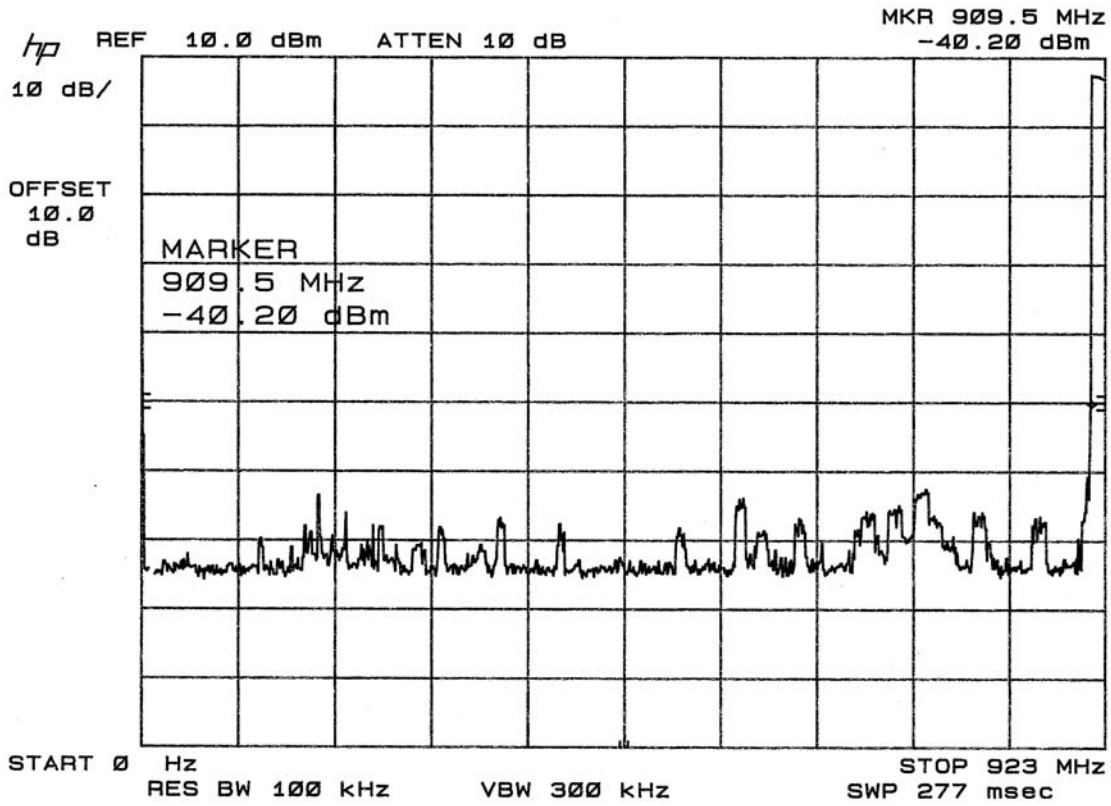
Channel Spacing



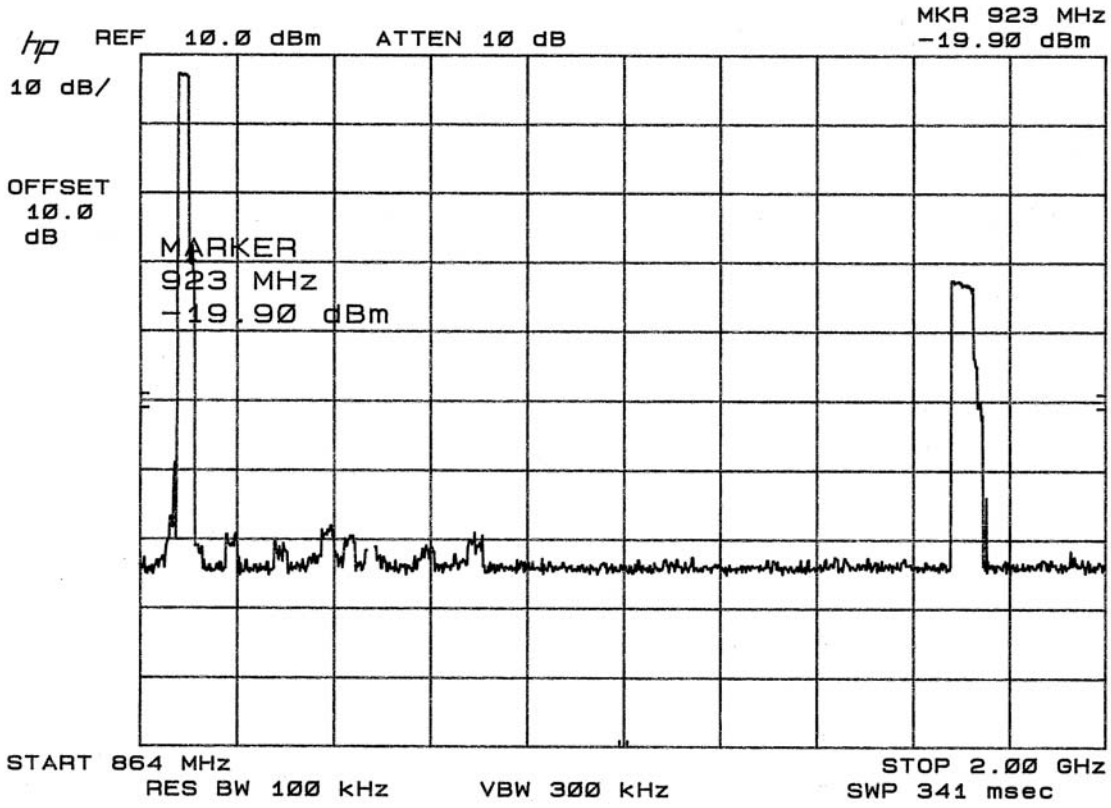
Channel Separation



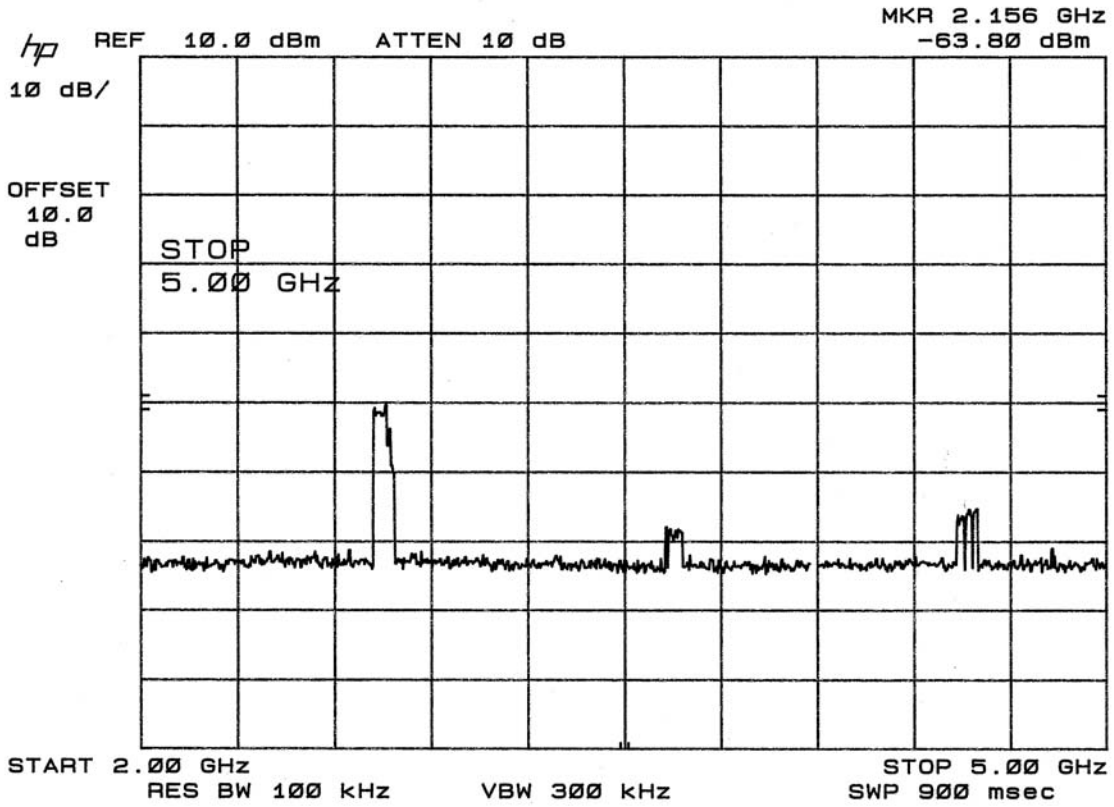
Spurious Conducted



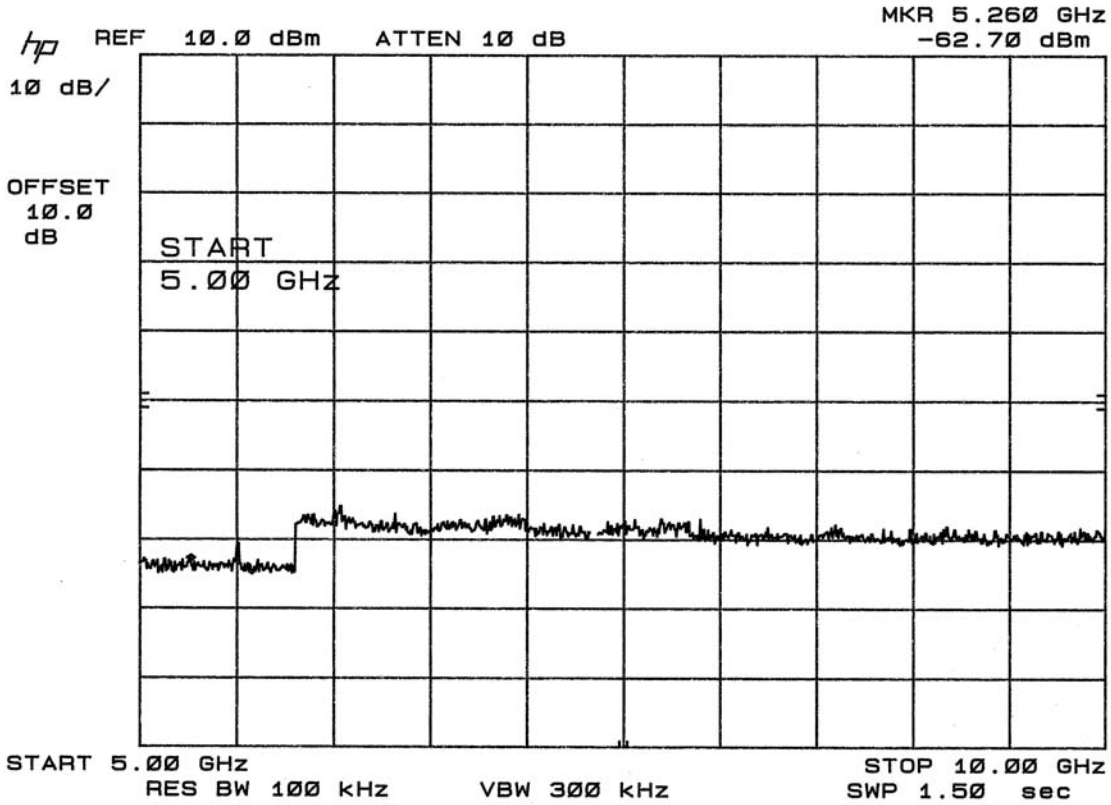
Spurious Conducted



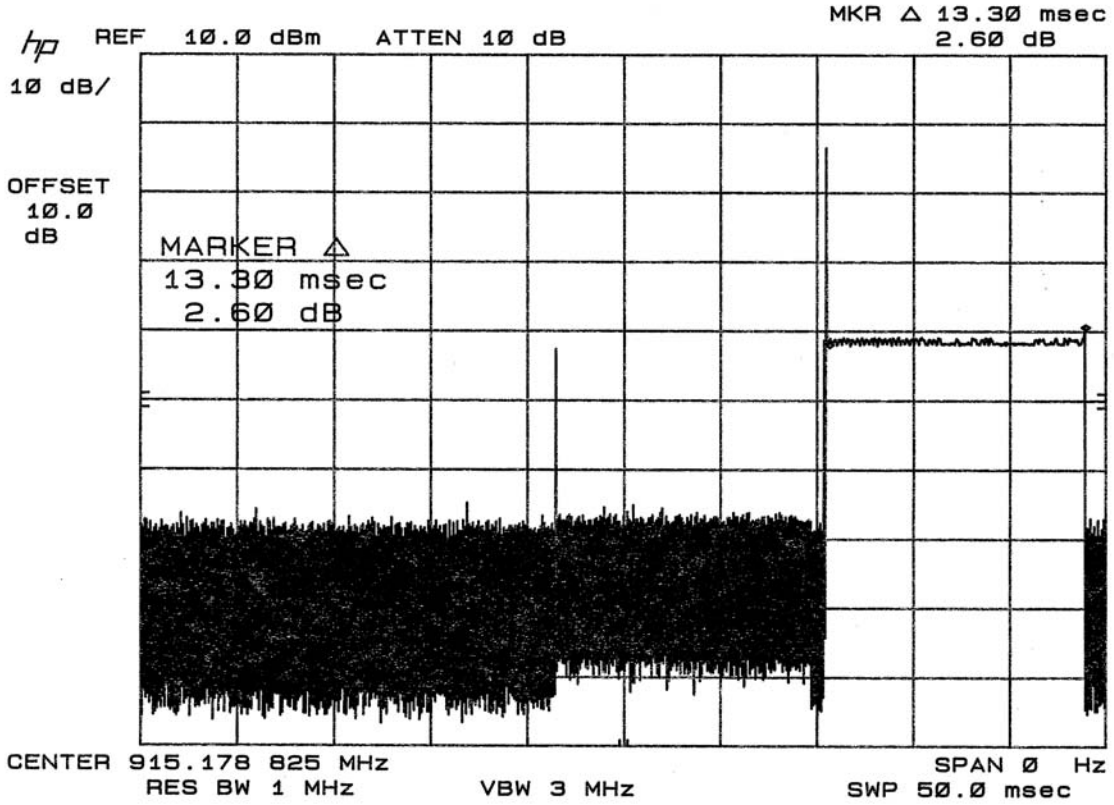
Spurious Conducted



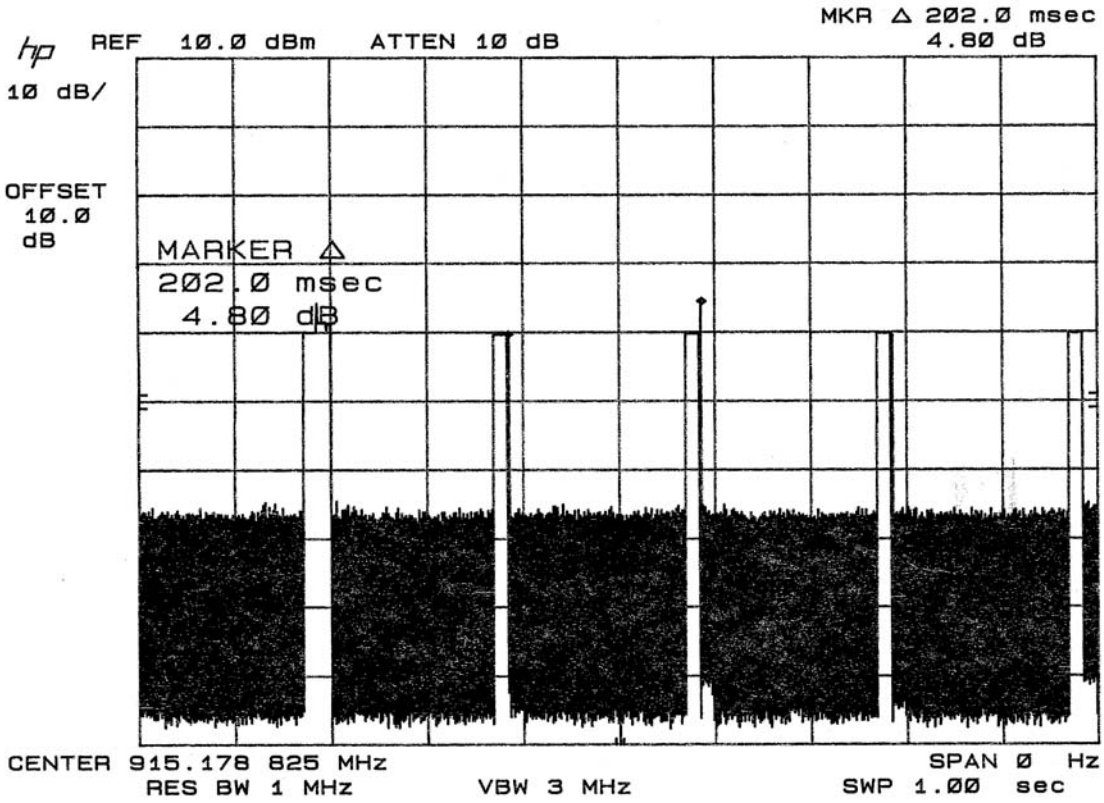
Spurious Conducted



Dwell Time


MKR Δ 13.30 msec
2.60 dB
REF 10.0 dBm ATTEN 10 dB
10 dB/
OFFSET
10.0
dB
MARKER Δ
13.30 msec
2.60 dB
CENTER 915.178 825 MHz
RES BW 1 MHz
VBW 3 MHz
SPAN 0 Hz
SWP 50.0 msec

Dwell Time


MKR Δ 202.0 msec
4.80 dB
hp REF 10.0 dBm ATTEN 10 dB
10 dB/
OFFSET
10.0
dB
MARKER Δ
202.0 msec
4.80 dB
CENTER 915.178 825 MHz
RES BW 1 MHz
VBW 3 MHz
SPAN 0 Hz
SWP 1.00 sec