



Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT
FCC PART 15.247 & INDUSTRY CANADA RSS-210

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FCC ID:	RIM-ICCU	GRANTEE FRN NUMBER:	0009610718
PLAT FORM:	N/A	RTL WORK ORDER NUMBER:	2003154
MODEL NUMBER / NAME:	iCCU	RTL QUOTE NUMBER:	QRTL03-971A
DATE OF TEST REPORT:	November 4, 2003		
American National Standard Institute:	ANSI C63.4: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
FCC Classification:	DSS – Part 15 Spread Spectrum Transmitter Frequency Hopping		
FCC Rule Part(s):	Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Frequency Hopping System		
Industry Canada Standard:	RSS-210: Low Power License-Exempt Radio Communication Devices (All Frequency Bands)		
Digital Interface Information	Digital Interface was found to be compliant		
Receiver Information	Receiver was found to be compliant		
Frequency Range (MHz)	Output Power* (W)	Frequency Tolerance	Emission Designator
902 – 928	0.05	N/A	N/A

* output power is maximum peak conducted

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report.

Furthermore, there was no deviation from, additions to, or exclusions from the FCC Part 2, FCC Part 15, Industry Canada RSS-210, and ANSI C63.4

Signature: 

Date: November 4, 2003

Typed/Printed Name: Desmond A. Fraser

Position: President

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1 GENERAL INFORMATION

1.1 SCOPE

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz. FCC DA 00-705 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems was also used for guidance.

IC RSS-210 Section 6.2.2(o): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.

The EUT utilizes a frequency hopping system operating in the 902 – 928 MHz band.

1.2 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

1.3 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application for certification.

1.4 MODIFICATIONS

Initially, transmit spurious emissions and emissions from the receiver LO were failing. The manufacturer redesigned the PCB to incorporate a pi low pass filter comprising two capacitors to ground and a series inductor before the antenna. The filter roll-off nominally starts at about 1GHz, thus providing some attenuation at the second harmonic and more at the third harmonic where it was most needed. Grounding and decoupling were also improved to reduce the receiver LO emissions, and two shields were added to the RF circuitry. Complete testing was performed with the new PCB and all tests were compliant. The manufacturer understands that the new PCB must be used on all production units.

2 TEST INFORMATION

2.1 TEST JUSTIFICATION

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. 902.5 MHz, 914.6 MHz and 927.8 MHz were tested and investigated from 9 kHz to 9.3 GHz. Data for all three channels is presented in this report.

Two identical antennas are used with the device (Nearson S467FL-L-RMM-915S). Both antennas will never transmit simultaneously. A manual switch is used to connect one of the antennas to the transceiver based on performance in a given installation. Conducted power was tested on each port on three frequencies to see if either port had higher power. The antenna connected to J201 had slightly higher power, so subsequent testing was performed with the antenna attached to J201.

The EUT also contains a Axonn LLC G-SENS STU satellite transceiver that is subject to Part 15 and Part 25 verification. This testing was performed by US Tech in August 2002. The US Tech project/report number for the Part 15 testing is 02-0226, and for the Part 25 testing is 02-0227. Collocation is addressed in the RF exposure exhibit in Appendix A.

2.2 EXERCISING THE EUT

The EUT was provided with software to continuously transmit on one channel or in the hopping mode during testing. The carrier was also checked to verify that information was being transmitted.

2.3 TEST RESULT SUMMARY

TABLE 2-1: TEST RESULT SUMMARY FOR FCC RULES AND REGULATIONS

STANDARD	TEST	PASS/FAIL OR N/A
FCC 15.205	Compliance with the Restricted Band Edge	Pass
FCC 15.207	Conducted Emissions	N/A
FCC 15.209	Radiated Emissions	Pass
FCC 15.247(a)(2)	Modulated Bandwidth	Pass
FCC 15.247(b)	Power Output	Pass
FCC 15.247(c)	Antenna Conducted Spurious Emissions	Pass

2.4 TEST SYSTEM DETAILS

The FCC Identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in Table 2-2.

TABLE 2-2: EQUIPMENT UNDER TEST (EUT)

Part	Manufacturer	Model	Serial Number	FCC Identifier	Cable Description	RTL Barcode
Concentration and communications unit	Luna iMonitoring	iCCU	13800023	RIM- ICCU	N/A	15426

TABLE 2-3: SUPPORT EQUIPMENT

Part	Manufacturer	Model	Serial Number	FCC Identifier	Cable Description	RTL Barcode
Pocket PC	Dell	AXIM X5 - HC01U	TW-0W0772-70161-32N-C0CV	DoC	N/A	15413
CFR	Luna iMonitoring	iCFR	1180016	RIM-ICFR	N/A	15412

3 COMPLIANCE WITH FCC §15.31(M)

In accordance with FCC 15.31(m) and because the EUT utilizes an operating band greater than 10 MHz, three frequencies were investigated for those tests that required the hopping function to be disabled. The following frequencies were tested: 902.4914 MHz, 914.6038 MHz and 927.7695 MHz.

4 COMPLIANCE WITH FCC §15.203

The RF connector used for antenna attachment is a reverse polarity SMA style connector which is not readily available to users through retail distribution.

5 COMPLIANCE WITH FCC §15.204

Please see Appendix B for antenna specifications.

6 COMPLIANCE WITH FCC §15.207

The EUT is strictly battery-operated with a solar cell for battery charging.

7 COMPLIANCE WITH THE BAND EDGE – FCC §15.247(C), §15.205; IC RSS-210 §6.3

7.1 TEST PROCEDURE

Compliance with the band edges was performed using the FCC’s “Radiated Measurement at a Band Edge” guidance document. The data taken in this report represents the worst case operation.

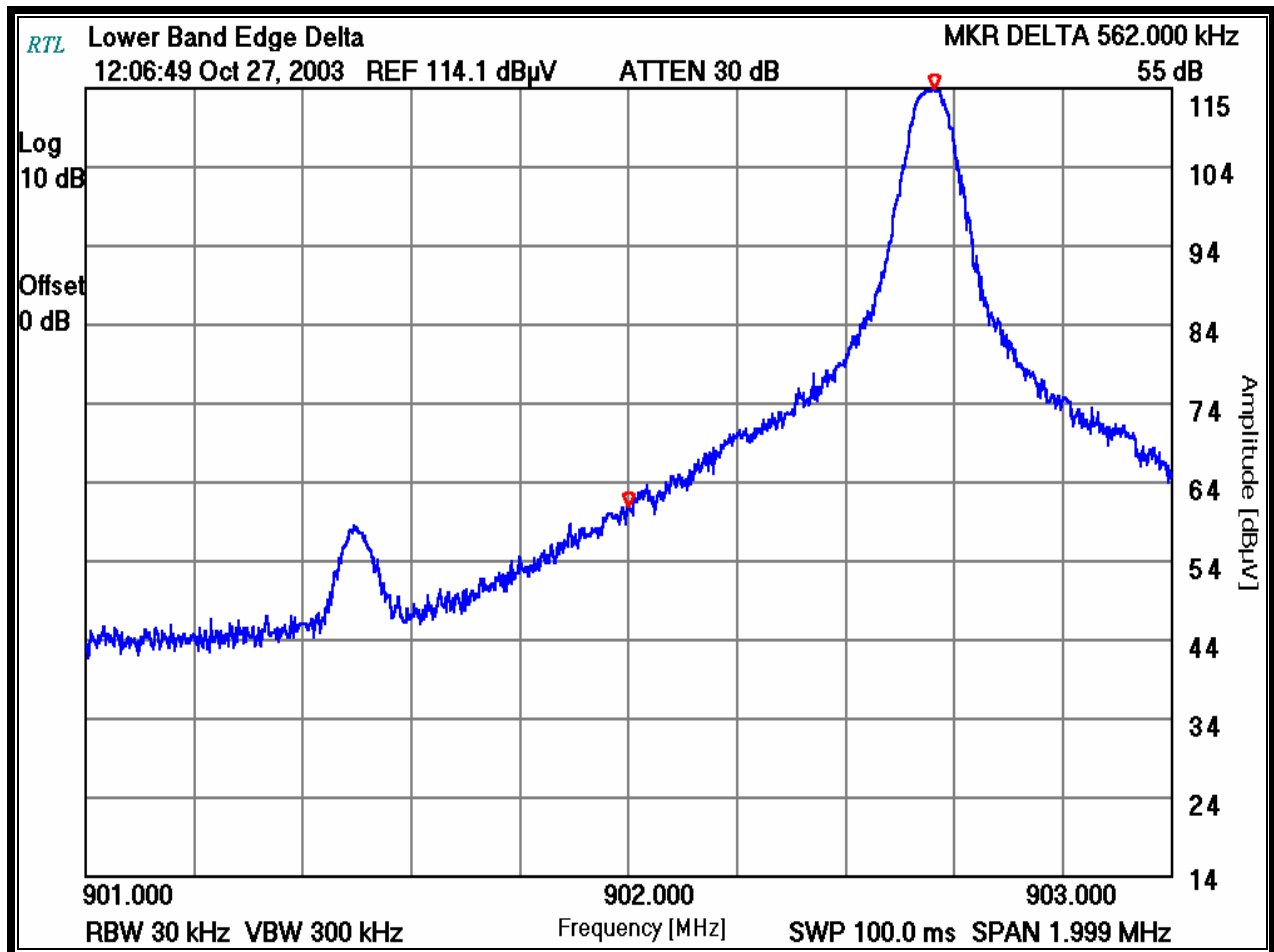
7.2 BAND EDGE TEST EQUIPMENT

TABLE 7-1: BAND EDGE TEST EQUIPMENT

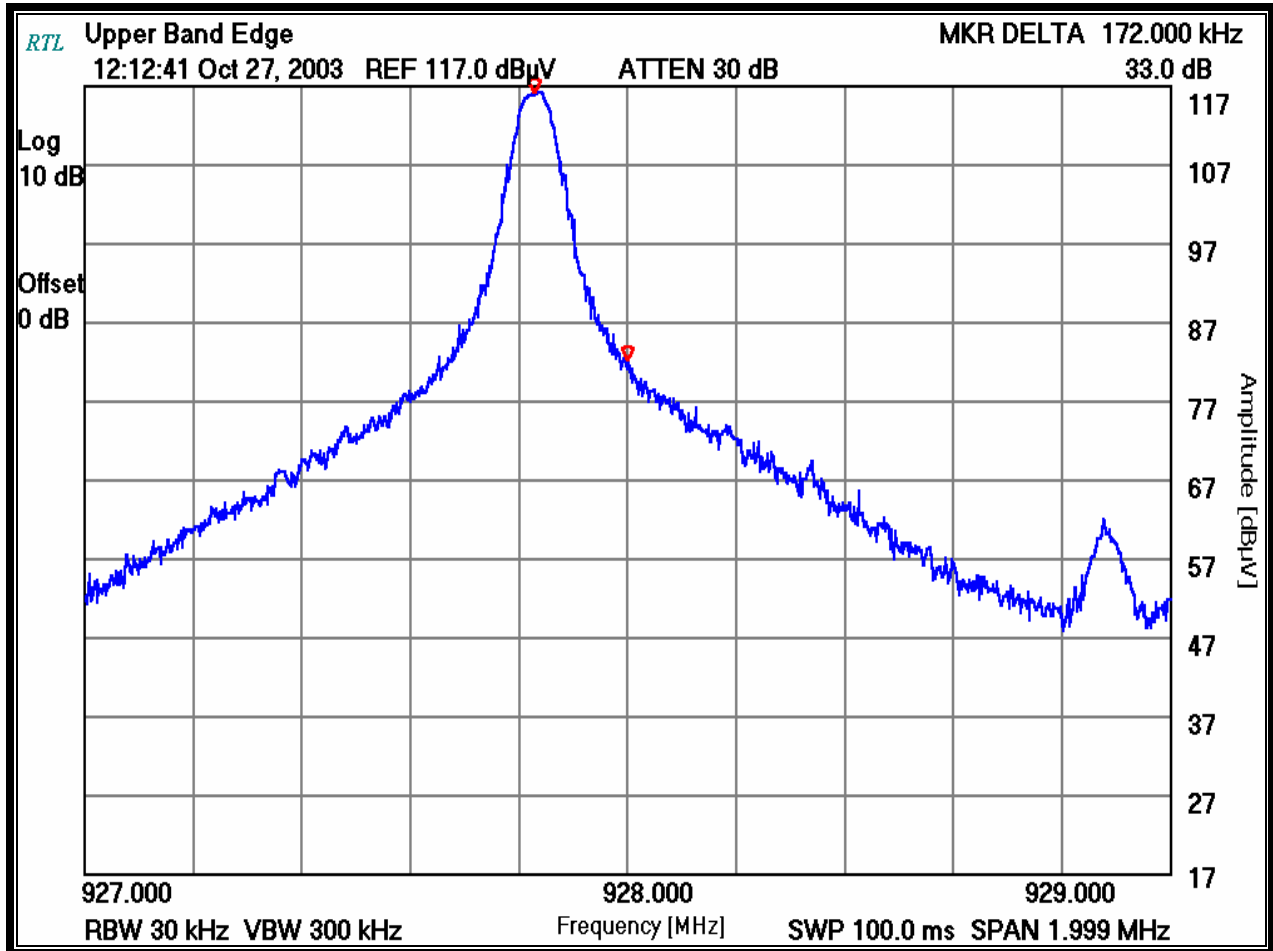
RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	7/03/04
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	5/12/04
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/12/04

7.3 RESTRICTED BAND EDGE PLOTS

PLOT 7-1: LOWER BAND EDGE: MARKER-DELTA METHOD (TX FREQUENCY: 902.4914 MHz)




PLOT 7-2: UPPER BAND EDGE: MARKER-DELTA METHOD (TX FREQUENCY: 927.7695 MHZ)



TEST PERSONNEL:

Rachid Sehb
 EMC Test Engineer


 Signature

October 27, 2003
 Date Of Test

8 RADIATED EMISSION LIMITS RECEIVER/DIGITAL INTERFACE – FCC §15.209; IC RSS-210 §7.3

8.1 RECEIVER/DIGITAL INTERFACE RADIATED EMISSION LIMITS TEST PROCEDURE

Emissions from the digital portion of the transceiver circuitry and the receiver of the EUT were tested and found to comply with the requirements of FCC Part 15.209. Digital emissions from the non-transceiver circuitry and transducer interface circuitry are subject to verification and are provided in a separate verification report held by the manufacturer and test laboratory.

8.2 RECEIVER/DIGITAL INTERFACE RADIATED EMISSIONS TEST EQUIPMENT

TABLE 8-1: RECEIVER/DIGITAL INTERFACE RADIATED EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900889	Hewlett Packard	85685A	RF Preselector for HP 8566B or 8568B (20 Hz - 2 GHz)	3146A01309	3/5/04
900905	Rhein Tech Labs	PR-1040	Amplifier	900905	9/15/04
900969	Hewlett Packard	85650A	Quasi-Peak Adapter	2412A00414	5/12/04
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20 MHz - 2 GHz)	2648	7/03/04
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	5/12/04
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/12/04

8.3 RECEIVER/DIGITAL INTERFACE RADIATED EMISSION LIMITS TEST DATA

TABLE 8-2: DIGITAL INTERFACE RADIATED EMISSION (ICCU)

Temperature: 74°F					Humidity: 43%				
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
221.191	Qp	H	50	1.0	46.1	-18.3	27.8	46.0	-18.2
368.650	Qp	V	90	1.0	49.3	-12.6	36.7	46.0	-9.3
398.138	Qp	H	50	2.0	46.9	-11.2	35.7	46.0	-10.3
575.092	Qp	H	90	1.0	49.8	-8.2	41.6	46.0	-4.4
589.838	Qp	H	-95	1.0	46.6	-7.9	38.7	46.0	-7.3
619.337	Qp	H	90	1.0	43.8	-7.4	36.4	46.0	-9.6

QP: RES. =100 KHZ, VID= 100 KHZ

TABLE 8-3: RECEIVER RADIATED EMISSION (ICCU)

Temperature: 77°F					Humidity: 43%				
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
902.665	Qp	H	90	1.5	46.0	-3.8	42.2	46.0	-3.8
914.769	Qp	H	90	1.5	46.4	-3.7	42.7	46.0	-3.3
927.941	Qp	H	40	1.5	47.1	-3.2	43.9	46.0	-2.1
1805.330	Av	H	0	1.0	40.5	-10.3	30.2	54.0	-23.8
1829.537	Av	H	0	1.0	40.3	-14.8	25.5	54.0	-28.5
1855.882	Av	H	0	1.0	39.6	-10.1	29.5	54.0	-24.6

QP: RES. =100 KHZ, VID= 100 KHZ

TEST PERSONNEL:

Rachid Sehb

EMC Test Engineer



Signature

October 27, 2003

Date Of Test

9 RADIATED EMISSION LIMITS; SPURIOUS AND HARMONICS – FCC §15.247; IC RSS-210 §6.3

9.1 RADIATED SPURIOUS EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The EUT was tested in the 3 orthogonal planes.

9.2 RADIATED SPURIOUS TEST EQUIPMENT

TABLE 9-1: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	3/15/04
900323	EMCO	3160-7	Horn Antennas (8.2 - 12.4 GHz)	9605-1054	6/10/04
900356	EMCO	3160-08	Horn Antennas (12.4 – 18 GHz)	9607-1044	6/10/04
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	4/10/04
901053	Schaffner & Chase	CBL6112B	Bilog Antenna (20 MHz - 2 GHz)	2648	7/3/04
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/12/04
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	5/12/04
900932	Hewlett Packard	8449B	Microwave Preamplifier, (1 - 26.5 GHz)	3008A00505	4/22/04
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	7/15/04
901232	IW Microwave Products	KPW-1503-2400-KPS	High Frequency RF Cables	240"	1/30/04
901235	IW Microwave Products	KPS-1503-360-KPS	High Frequency RF Cables	36"	1/30/04

9.3 RADIATED EMISSIONS HARMONICS/SPURIOUS TEST DATA

TABLE 9-2: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 902.4914 MHZ)

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1805.332	40.1	31.3	29.5	60.8	95.9	-35.1
2707.615	41.4	33.5	10.1	43.6	54.0	-10.4
3610.095	43.2	35.8	11.1	46.9	54.0	-7.1
4512.707	43.6	37.6	14.8	52.4	54.0	-1.6
5415.984	40.1	31.1	13.5	44.6	54.0	-9.4
6318.647	40.5	31.5	13.0	44.5	95.9	-51.4
7220.351	43.0	33.3	12.1	45.4	95.9	-50.5
8122.899	31.8	29.0	11.5	40.5	54.0	-13.5
9025.447	30.2	20.5	16.8	37.3	54.0	-16.7

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz

TABLE 9-3: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 914.6038 MHZ)

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1829.544	40.5	33.5	30.1	63.6	97.1	-33.5
2743.968	41.5	33.0	10.1	43.1	54.0	-10.9
3659.088	42.5	35.0	10.3	45.3	54.0	-8.7
4573.267	44.0	36.8	15.0	51.8	54.0	-2.2
5487.933	40.1	31.3	13.6	44.9	97.1	-52.2
6402.599	41.5	31.8	13.1	44.9	97.1	-52.2
7318.176	42.0	33.5	11.6	45.1	54.0	-8.9
8231.932	34.7	27.0	16.7	43.7	54.0	-10.3
9146.598	31.3	21.2	16.5	37.7	54.0	-16.3

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz

TABLE 9-4: RADIATED EMISSIONS HARMONICS/SPURIOUS (TX FREQUENCY: 927.7695 MHZ)

Emission Frequency (MHz)	Analyzer Reading (dBuV) Peak	Analyzer Reading (dBuV) Average	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1855.883	39.4	31.3	30.2	61.5	96.2	-34.7
2783.466	41.5	33.3	9.3	42.6	54	-11.4
3711.294	40.5	32.0	10.0	42.0	54	-12
4639.122	41.5	33.7	15.0	48.7	54.0	-5.3
5566.949	40.5	31.3	14.0	45.3	96.2	-50.9
6495.573	41.2	32.8	12.8	45.6	96.2	-50.6
7423.511	42.5	33.5	12.0	45.5	54	-8.5
8350.433	32.8	19.8	16.8	36.6	54	-17.4
9278.261	31.2	20.7	16.8	37.5	96.2	-58.7

PEAK: RES. =1 MHz, VID= 1MHz; AVERAGE: RES. =1 MHz, VID= 10Hz

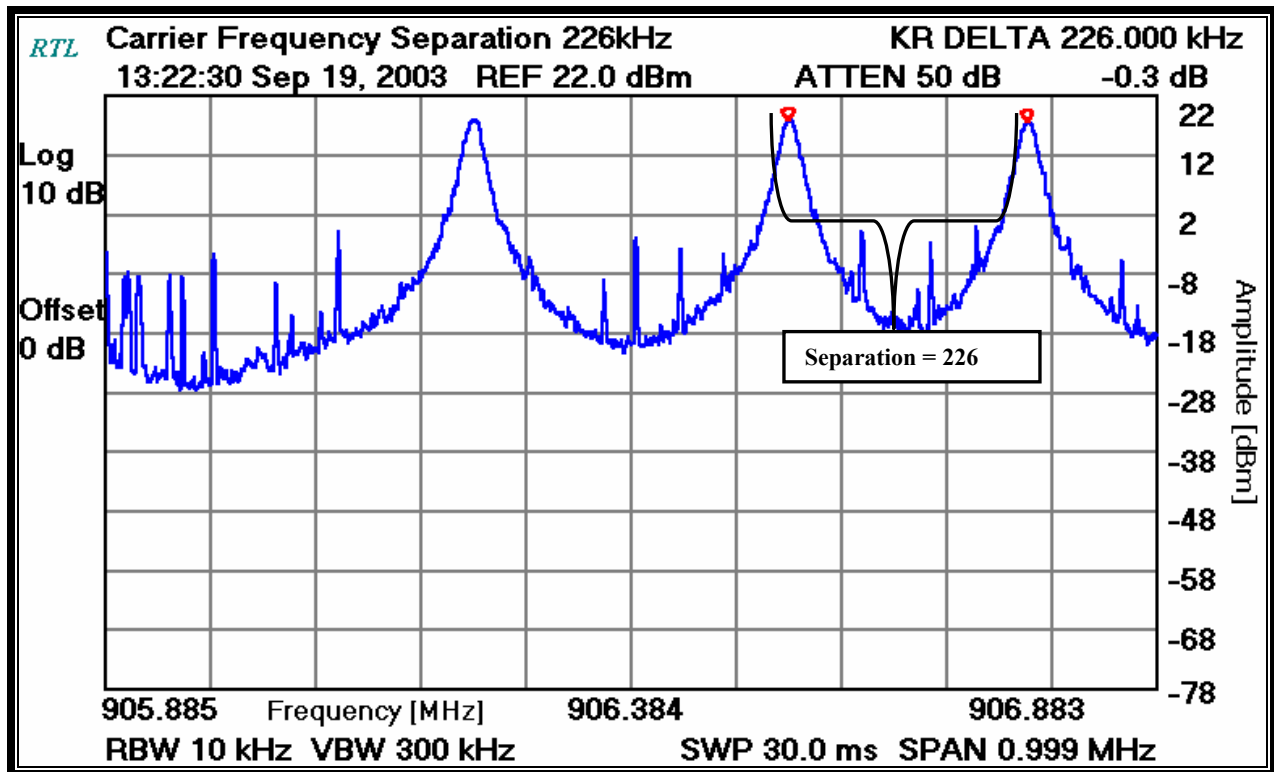
TEST PERSONNEL:

Rachid Sehb		October 27, 2003
EMC Test Engineer	Signature	Date Of Test

10 CARRIER FREQUENCY SEPARATION - §15.247(A)(1)

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. The greatest measured 20 dB bandwidth was 103.8 kHz; since this is greater than 25 kHz, 103.8 kHz should be used as the minimum separation. As shown by the plot below, the EUT met this requirement.

PLOT 10-1: CARRIER FREQUENCY SEPARATION



TEST PERSONNEL:

Daniel W. Baltzell
 EMC Test Engineer

Signature

September 19, 2003
 Date Of Test

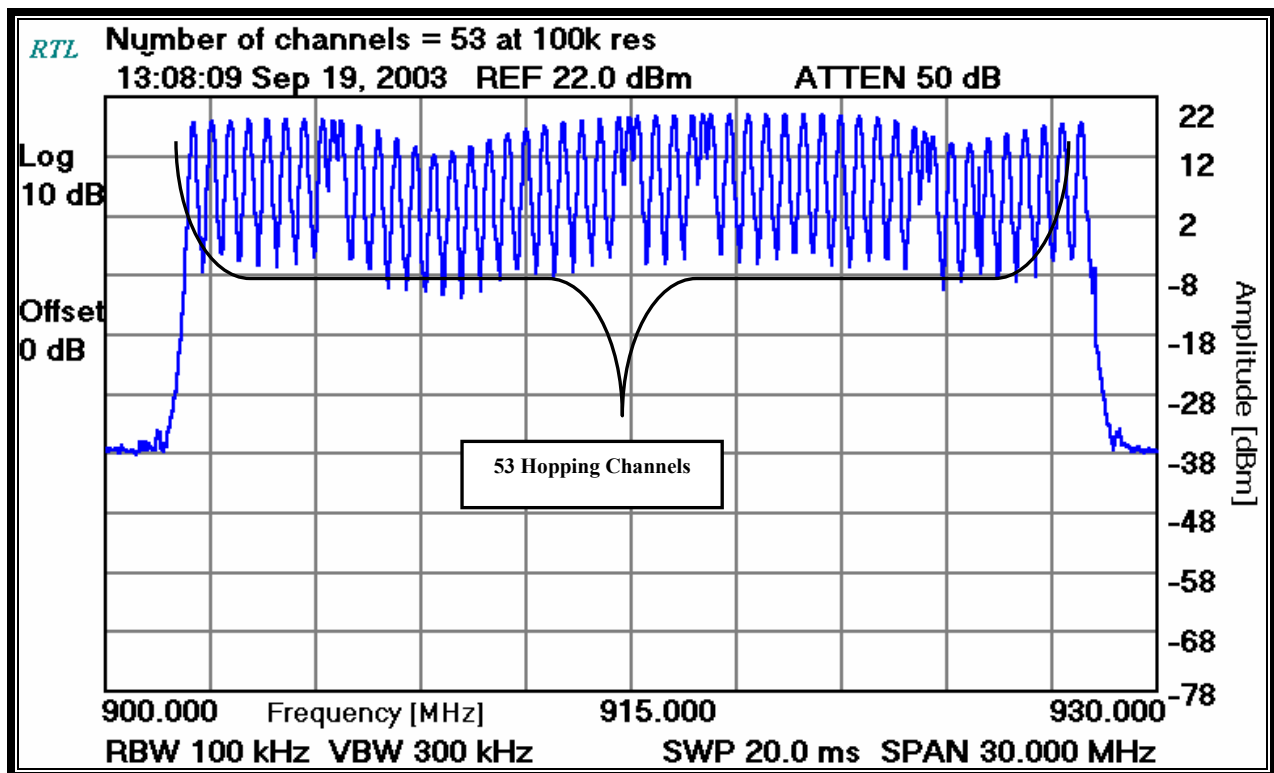
11 HOPPING CHARACTERISTICS – FCC §15.247 (A)(1)(I); IC RSS-210 §6.2.2(O)

For frequency hopping systems operating in the 902 - 928 MHz band: 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 greater 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.

Since the 20 dB bandwidth of the EUT is less than 250 kHz, 50 hopping frequencies must be used. As shown by the plot below, the EUT met this requirement (53 hopping frequencies).

11.1 NUMBER OF HOPPING FREQUENCIES

PLOT 11-1: NUMBER OF HOPPING FREQUENCIES



TEST PERSONNEL:

Daniel W. Baltzell

September 19, 2003

EMC Test Engineer

Signature

Date Of Test

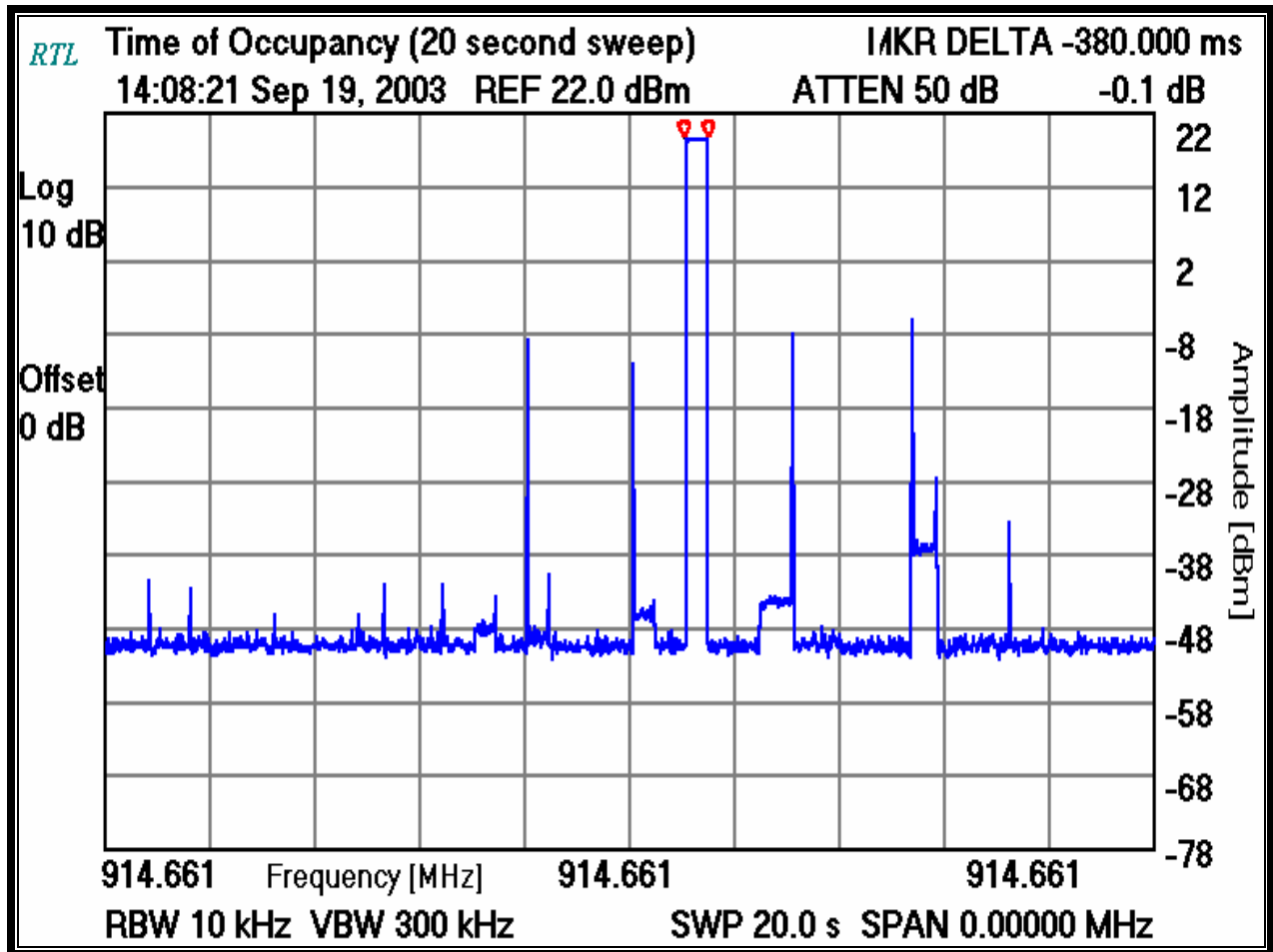
11.2 AVERAGE TIME OF OCCUPANCY

Since the 20 dB bandwidth of the EUT is less than 250 kHz, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period. As shown and described by the plot and description below, the EUT met this requirement (380 ms).

In discovery mode, a transmitting device alternates between hopping with 1ms dwell time and hopping with 15ms dwell time. Transmission occurs on all 53 channels with 1ms dwell time followed by a single 15ms dwell at the next frequency. The device then stops transmission to listen for a response for approximately 8ms on the same channel and then restarts hopping with 1ms dwell time on all 53 channels followed by a 15ms dwell at the next frequency, etc. In this way the channel with 15ms dwell time advances one position in the hop sequence for each 15ms dwell occurrence (which occurs every 76ms). Thus one 15ms dwell occurs for all 53 channels in the space of 4.028 seconds, and the whole sequence then repeats, typically until discovery of any potential target receiver(s) is complete. The net result is that each channel is occupied for 69 milliseconds in any 4.028 seconds interval, and in any case not more than 400ms in any 20 second period.

In normal transmission a transmitting device channel hops in a pre-defined pseudo random sequence of 53 steps. Hopping is in synchronism with its target receiver with a hop rate of 3 hops per second. Any one channel is occupied for 333ms in this hop sequence which repeats after 53/3 seconds (17.667 seconds). In any case each channel in the hop sequence occupies no more than 400ms in any 20 second period.

PLOT 11-2: TIME OF OCCUPANCY (DWELL TIME)



TEST PERSONNEL:

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11.3 20 dB BANDWIDTH – FCC §15.247 (a)(1)(i); IC RSS-210 §5.9.1

The minimum 20 dB bandwidths were measured using a 50 ohm spectrum analyzer. The carrier was adjusted on the analyzer so that it was displayed entirely on the Spectrum Analyzer. The sweep time was set to 10 seconds and allowed through several sweeps with the max hold function used in peak detector mode. The resolution bandwidth was set to 100 kHz, and the video bandwidth set at 300 kHz. The minimum 20 dB bandwidths were measured using the spectrum analyzer delta marker set 20 dB down from the peak of the carrier.

The maximum allowed 20 dB bandwidth is 500 kHz. As shown in the following table and plots, the EUT met this requirement.

TABLE 11-1 20 DB BANDWIDTH TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz – 22 GHz)	3138A0777 1	5/12/04

TABLE 11-2 MODULATED BANDWIDTH TEST DATA

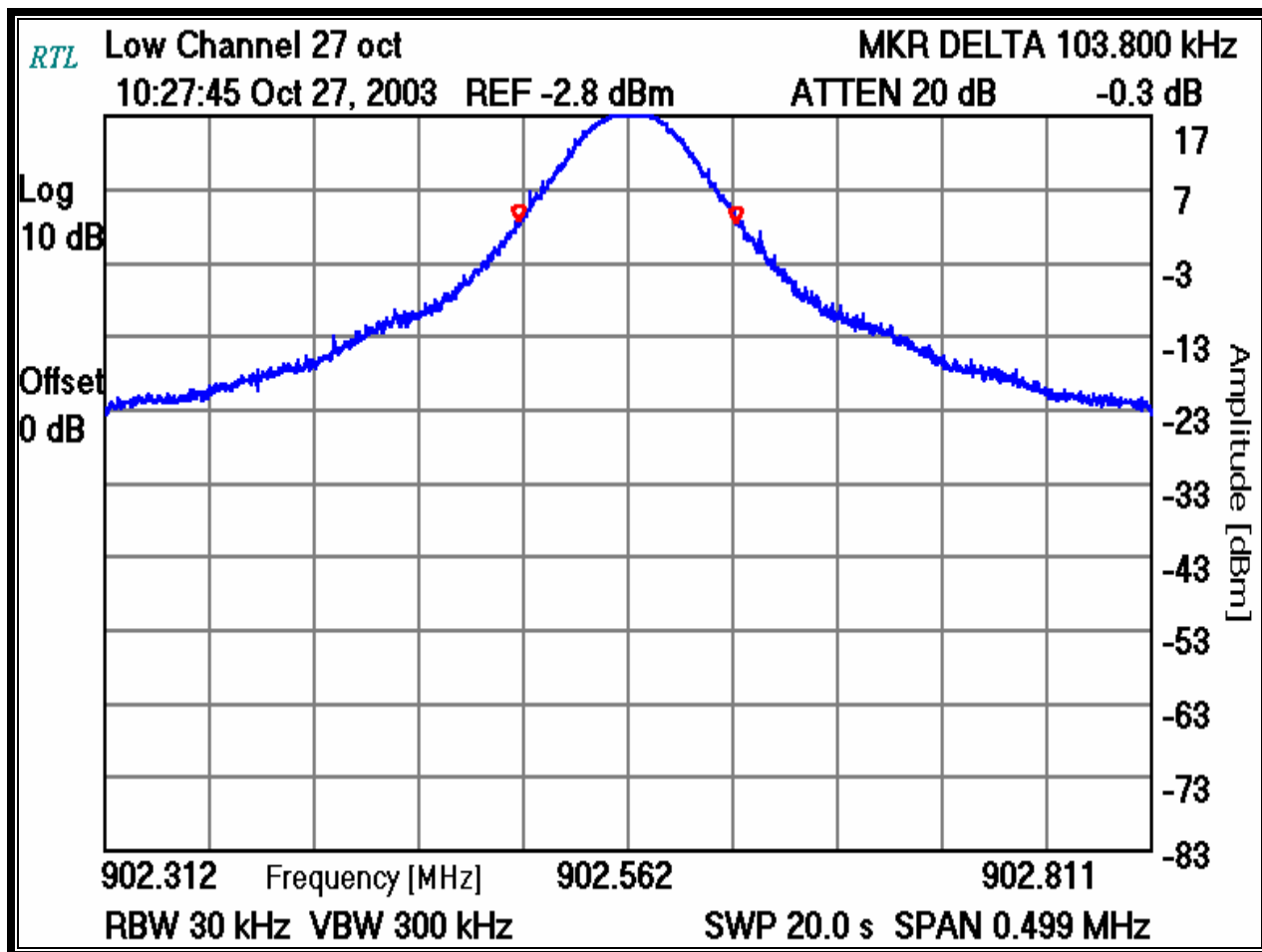
Minimum 20 dB bandwidths

FREQUENCY (MHz)	20 dB BANDWIDTH (kHz)
902.4914	103.8
914.6038	100.0
927.7695	93.3

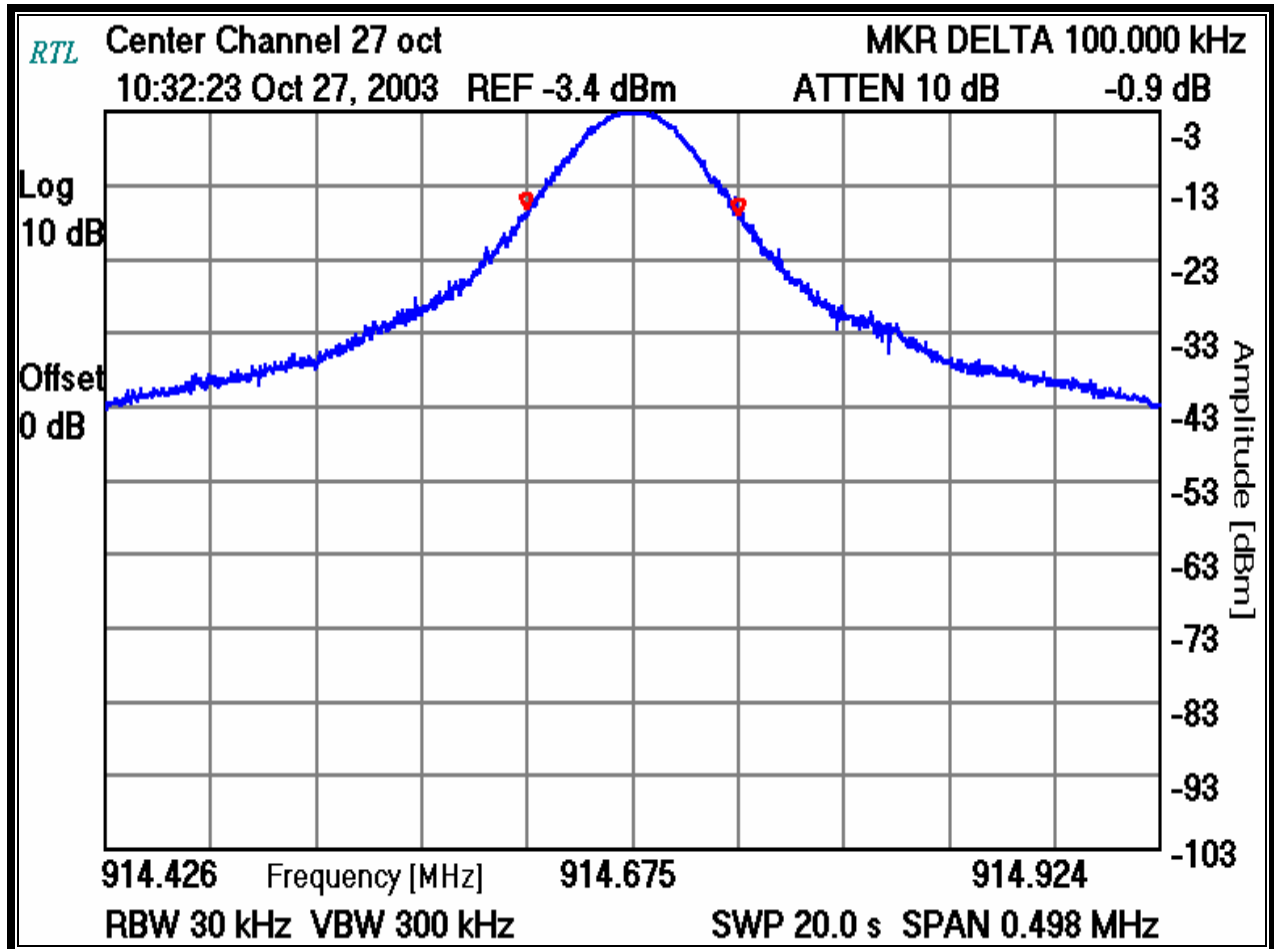
TEST PERSONNEL:

Rachid Sehb		October 27, 2003
EMC Test Engineer	Signature	Date Of Test

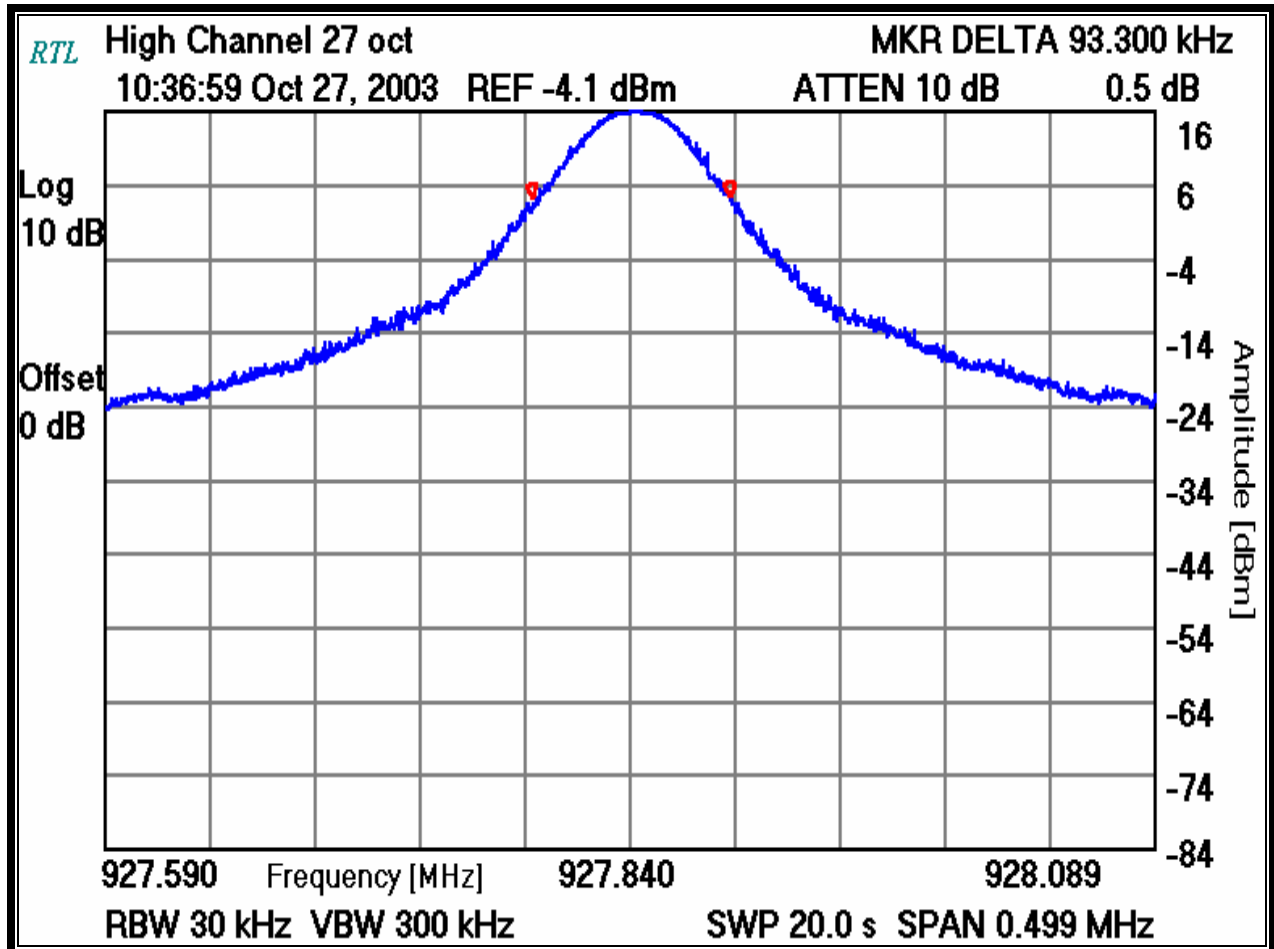
PLOT 11-3: 20 DB BANDWIDTH (TX FREQUENCY: 902.4914 MHZ)



PLOT 11-4: 20 DB BANDWIDTH (TX FREQUENCY: 914.6038 MHZ)




PLOT 11-5: 20 DB BANDWIDTH (TX FREQUENCY: 927.7695 MHz)



TEST PERSONNEL:

Rachid Sehb
 EMC Test Engineer


 Signature

October 27, 2003
 Date Of Test

12 PEAK OUTPUT POWER - FCC §15.247(B)(2); IC RSS-210 §6.2.2(O)(B)

For frequency hopping systems operating in the 902-928 MHz band and employing at least 50 hopping channels, the maximum peak output power must not exceed 1 W. As shown by the table below, the EUT met this requirement.

12.1 CONDUCTED ANTENNA PORT POWER OUTPUT TEST PROCEDURE

A conducted power measurement of the EUT was taken using an Agilent 4416A EPM-P Series Power Meter with an E9323A Peak and Average Power Sensor.

12.2 CONDUCTED ANTENNA PORT POWER OUTPUT TEST EQUIPMENT

TABLE 12-1: CONDUCTED ANTENNA PORT POWER OUTPUT TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
901186	Agilent Technologies	E9323A (50 MHz-6 GHz)	Peak & Avg. Power Sensor	US40410380	7/30/04
901184	Agilent Technologies	E4416A	EPM-P Power Meter, Single Channel	GB41050573	7/30/04
901140	Weinschel Corp.	47-10-34 DC- 18GHz	Attenuator, 50W 10dB	BK6203	5/13/04

12.3 CONDUCTED ANTENNA PORT POWER OUTPUT TEST DATA

TABLE 12-2: CONDUCTED ANTENNA PORT POWER OUTPUT TEST DATA

FREQUENCY (MHz)	PEAK POWER RIGHT ANTENNA CONDUCTED OUTPUT (dBm)	PEAK POWER LEFT ANTENNA CONDUCTED OUTPUT (dBm)
902.4914	16.5	17.0
914.6038	16.5	17.0
927.7695	15.5	16.1

TEST PERSONNEL:

Rachid Sehb		October 27, 2003
EMC Test Engineer	Signature	Date Of Test

13 ANTENNA CONDUCTED SPURIOUS EMISSIONS - §15.247(C); IC RSS-210 §6.2.2(O)(E1)

13.1 ANTENNA CONDUCTED SPURIOUS EMISSIONS TEST PROCEDURES

Antenna spurious emission per FCC 15.247(c) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The modulated carrier was identified at the following frequencies: 902.4914 MHz, 914.6038 MHz and 927.7695 MHz. No other harmonics or spurs were found within 20 dB of the carrier level from 9kHz to the carrier 10th harmonic. See the Antenna Conducted Spurious Noise Table. The low, middle, and high frequencies were investigated for the left and right antenna port. The worst case was found for the left antenna; see results below.

13.2 ANTENNA CONDUCTED SPURIOUS TEST EQUIPMENT

TABLE 13-1: ANTENNA CONDUCTED SPURIOUS TEST EQUIPMENT

RTL ASSET #	MANUFACTURER	MODEL	PART TYPE	SERIAL NUMBER	CALIBRATION DUE DATE
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz – 22 GHz)	3138A07771	5/12/04

13.3 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 902.4914 MHz)

Operating Frequency (MHz): 902.4914
 Measured Level at 100kHz (dBm): 17.0
 Limit (dBm): -3.0

TABLE 13-2: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 902.4914 MHz)

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
225.2	-35.4	52.4	20.0	-32.4
961.2	-35.1	52.1	20.0	-32.1
990.9	-35.4	52.4	20.0	-32.4
959.7	-34.9	51.9	20.0	-31.9
1802.9	-35.4	52.4	20.0	-32.4
1805.2	-34.6	51.6	20.0	-31.6
2707.7	-39.2	56.2	20.0	-36.2
3609.9	-38.6	55.6	20.0	-35.6
4512.8	-38.7	55.7	20.0	-35.7
5415.2	-38.4	55.4	20.0	-35.4
6317.6	-32.7	49.7	20.0	-29.7
7220.1	-32.7	49.7	20.0	-29.7
8122.7	-32.7	49.7	20.0	-29.7
9025.0	-33.3	50.3	20.0	-30.3

TEST PERSONNEL:

Rachid Sehb
 EMC Test Engineer



Signature

October 27, 2003
 Date Of Test

13.4 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 914.6038 MHz)


Operating Frequency (MHz): 914.6038
 Measured Level at 100kHz (dBm): 17.0
 Limit (dBm): -3.0

TABLE 13-3: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 914.6038 MHz)

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
1829.2	-34.3	51.3	20.0	-31.3
2743.8	-37.8	54.8	20.0	-34.8
3658.5	-37.0	54.0	20.0	-34.0
4573.0	-37.3	54.3	20.0	-34.3
5487.6	-38.1	55.1	20.0	-35.1
6402.0	-32.2	49.2	20.0	-29.2
7316.8	-32.2	49.2	20.0	-29.2
8231.6	-31.1	48.1	20.0	-28.1
9145.9	-31.7	48.7	20.0	-28.7

TEST PERSONNEL:

Rachid Sehb
 EMC Test Engineer


 Signature

October 27, 2003
 Date Of Test

13.5 ANTENNA CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 927.7695 MHz)

Operating Frequency (MHz): 927.7695
 Measured Level at 100kHz (dBm): 16.1
 Limit (dBm): -3.9

TABLE 13-4: CONDUCTED SPURIOUS EMISSIONS (TX FREQUENCY: 927.7695 MHz)

Frequency (MHz)	Measured Level (dBm)	Measured Level (dBc)	Limit (dBc)	Margin (dB)
1855.8	-33.3	49.4	20.0	-29.4
2783.2	-37.6	53.7	20.0	-33.7
3711.0	-36.8	52.9	20.0	-32.9
4638.7	-36.8	52.9	20.0	-32.9
5566.4	-36.8	52.9	20.0	-32.9
6494.1	-31.9	48.0	20.0	-28.0
7422.4	-30.9	47.0	20.0	-27.0
8348.7	-30.9	47.0	20.0	-27.0
9276.5	-30.9	47.0	20.0	-27.0

TEST PERSONNEL:

Rachid Sehb
 EMC Test Engineer



Signature

October 27, 2003
 Date Of Test

Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: Luna iMonitoring
Model Name: iCCU
FCC ID: RIM-ICCU
FCC: 15.247
IC: RSS-210

14 CONCLUSION

The data in this measurement report shows that the EUT, FCC ID: RIM-ICCU, when used with the Nearson S467AH-915S antenna, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and Industry Canada RSS-210.