



REPORT

For

OMNEX Control Systems ULC

Bldg. 74-1833 Coast Meridian Road
Port Coquitlam, B.C.
V3C 6G5, CANADA

Date: Dec. 07, 2007
Report No.: 8973-1E
Revision No.: 1
Project No.: 8973
Equipment: 900MHz Transceiver Module
Model No.: OEM900MR

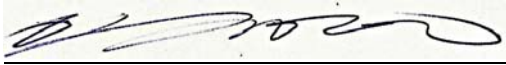

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FCC Part 15.247/IC RSS 210	
Report reference No.	8973-1E
Report Revision History:	<ul style="list-style-type: none"> ➤ 0 – November 07, 2007 ➤ 1 – December 06, 2007 : Updated graphs & photos
Tested by (printed name and signature)	Jeremy LEE 
Approved by (printed name and signature)	Kavinder Dhillon, Eng.L. 
Date of issue	Dec. 07, 2007
Note: By signing this report, both the Testing Technician and the Reviewer hereby declare to abide by the applicable LabTest policies: 1.) Statement of Independence # 3014 (LabTest Employees), 2.) Independence, Impartiality, and Integrity #1039, clause 11 (Engineering Service Subcontractors), or 3.) Independence, Impartiality, and Integrity #1019, clause 3.5 (Testing Subcontractors).	
FCC Site Registration No.:	552549
IC Site Registration No.:	5970A
Testing Laboratory Name	LabTest Certification Inc.
Address	3133 – 20800 Westminster Hwy, Richmond, B.C. V6V-2W3
OATS Test Location Name	LabTest Certification Inc.
Address	5340 – 164 Street, Surrey, BC, Canada
Applicant's Name	Omnex Control Systems ULC
Address	Bldg.74-1833 Coast Meridian Road, Port Coquitlam, B.C. V3C 6G5
Manufacturer's Name	Same as Applicant
Address	Same as Applicant
Test specification	902-928MHz Frequency Hopping Spread Spectrum Transceiver
Standards	FCC15.247/RSS-210, Issue 7
Date Test sample received	Oct. 17, 2007
Date of Testing	Oct. 17 to Dec. 07, 2007
Test item description	
Manufacturer	Omnex Control Systems ULC
Model and/or type reference	OEM900MR
Serial numbers	0241110001, DSCH-3022R03
Transmitter Board ID	IA9FHOEM900MR
Frequency Range:	902MHz - 928MHz
Power (W):	+1 Watt (MAX)
Rating(s)	+22 - +30Vdc

1 Device Under Test Description

Type of modulation:	
No. Hopping Channels: (FHSS)	50 channels
Dwell time per channel	4.025msec.
Max. time between two instances of use of the same channel:	700msec.
Operating Frequency Range:	902.75MHz – 927.25MHz
Type of Equipment:	900MHz Spread Spectrum Data Transceiver Module
Operating Temperature Range:	-30 °C to +70 °C
Nominal Voltages for:	<input type="checkbox"/> stand-alone equipment <input checked="" type="checkbox"/> combined (or host) equipment <input type="checkbox"/> test jig
Supply Voltage:	<input type="checkbox"/> AC <input type="checkbox"/> Amps <input checked="" type="checkbox"/> 24V DC <input type="checkbox"/> Amps
If DC Power:	<input type="checkbox"/> Internal Power Supply <input checked="" type="checkbox"/> External Power Supply or AC/DC adapter <input type="checkbox"/> Battery <ul style="list-style-type: none"> <input type="checkbox"/> Nickel Cadmium <input type="checkbox"/> Alkaline <input type="checkbox"/> Nickel-Metal Hydride <input type="checkbox"/> Lithium-Ion <input type="checkbox"/> Lead Acid (Vehicle regulated) <input type="checkbox"/> Other
Test Modulation Used:	FSK
General Product Information:	The module will typically be integrated into systems used for the remote control and monitoring of industrial equipment such as cranes, concrete pumps, loaders, etc.. The MR-900 transceiver module is embedded as part of a complete OMNEX control system and is not sold separately as a stand-alone device.

2 Additional Information from Client

Highest overall EIRP value:	_____ dBm	Power Setting:	
Corresponding conducted power setting:	_____ dBm		
Power level to be used for testing:	__+30__ dBm		
Corresponding Antenna assembly gain:	_____ dBm	Antenna Assembly:	
Antenna gain to be taken into account for calculating EIRP values:	_____ dBi		

a) Modulation:	ITU Class of emissions:	
	Can the transmitter operate un-modulated?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
b) Duty Cycle:	The transmitter is intended for:	<input type="checkbox"/> Continuous duty <input type="checkbox"/> Intermittent duty <input checked="" type="checkbox"/> Continuous operation possible for testing purposes
c) About EUT:	<input checked="" type="checkbox"/> EUT submitted are representative product models <input type="checkbox"/> If not, the EUT submitted are pre-production models	
	<input type="checkbox"/> If pre-production equipment are submitted, the final production equipment will be identical in all respects with equipment tested. <input type="checkbox"/> If not, supply full details:	
	<input type="checkbox"/> The equipment submitted is CE marked:	
	<input type="checkbox"/> The CE marking does include the Class-II identifier (Alert Sign) <input type="checkbox"/> The CE marking does include a 4 digit number referring to the Notified Body involved	

3 List of ancillary and/or support equipment provided by the applicant

Model:	Description:	Ratings:	Approvals/Standards
RAD-ISM-900-ANT-OMNI-0-6	¼ wave Whip Antenna w/ Cable	-	-
YA6900W	YAGI 4 ELEMENT 8dBi 890-960 MHz	-	-
20ft Cable	Connecting EUT and YAGI Antenna with 6dB Cable Loss.	-	-

4 Test Summary

Test	FC CFR 47	RSS 210	Result
Antenna Requirements	15.204(c)		PASS
Bandwidth	15.247(a)(1)	A8.1	PASS
Channel Separation	15.247(a)(1)	A8.1	PASS
Number of Channels	15.247(a)(1)	A8.1	PASS
Time of occupancy	15.247(a)(1)	A8.1	PASS
Maximum peak conducted output power	15.247(b)(2), (4)	A8.4	PASS
Antenna Gain	15.247(b)(4)		PASS
RF Exposure	15.247(b)(5)		PASS
Conducted Spurious Emissions	15.247(d)	A8.5	PASS
Out of Band Edge Emissions	15.247(d)	A8.5	PASS
Radiated Spurious Emissions	15.247(d)	A8.5	PASS
Continuous data and short transmissions	15.247(g)		PASS
Coordination Frequency Hopping	15.247(h)		PASS
AC Power Line Conducted Emission	15.207(a)		N/A

5 Antenna Requirements

FCC15.204(C)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators, which in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

Test Result:

The 900MHz Spread Spectrum Data Transceiver Module, MR-900 attached MCX connector to comply with the requirements.



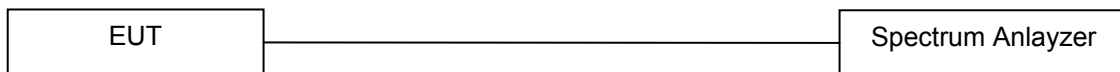
6 20dB Bandwidth

15.247(a)(1)

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

6.1 Test Procedure:

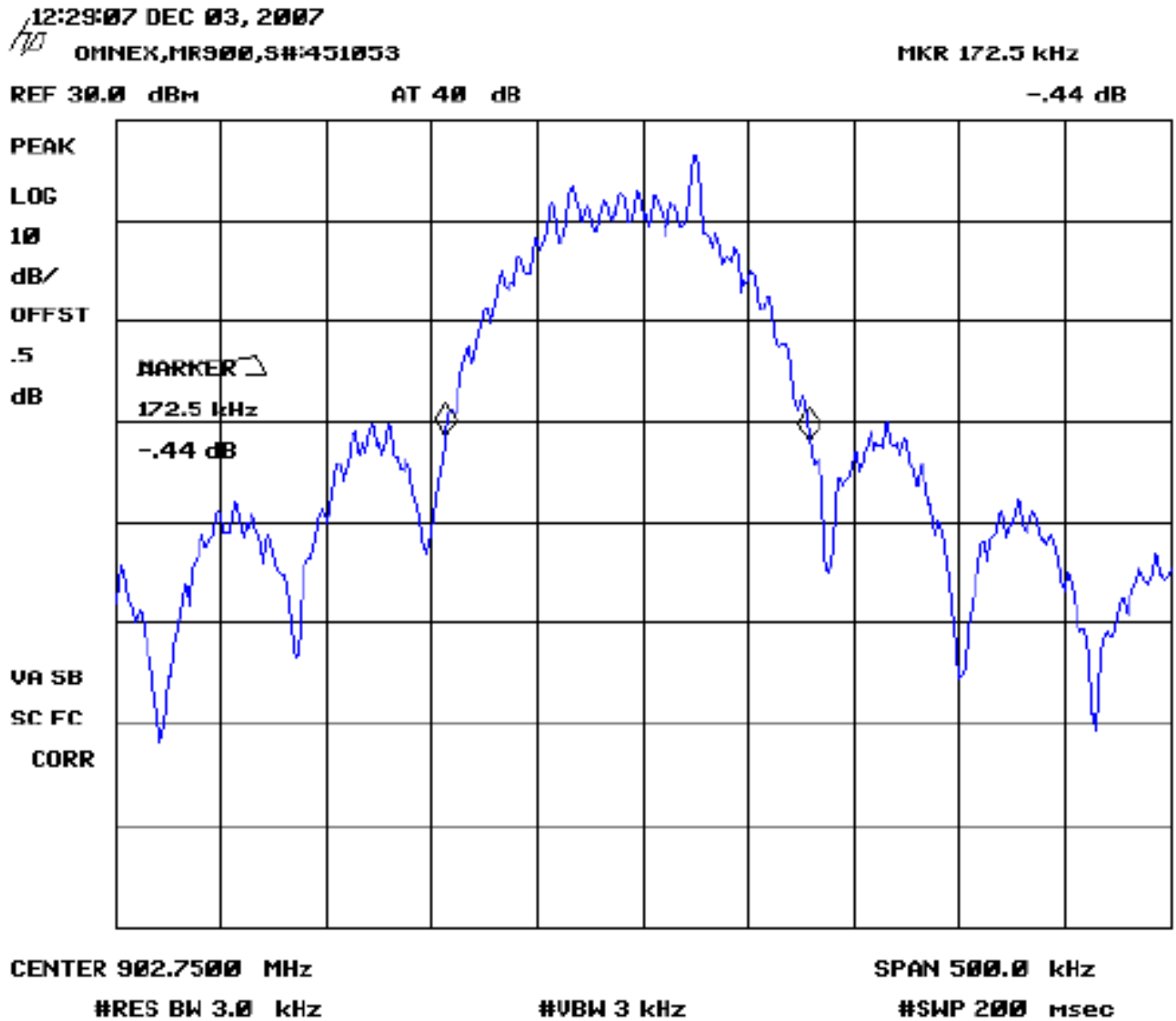
- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter shall be transmitting at its maximum data rate.
- The following measurements were made with
 - Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel
 - RBW \geq 1% of the 20dB BW span
 - VBW \geq RBW
 - Sweep = auto
 - Detector Function = peak
 - Trace = max hold
- Allow the trace to stabilize.
- Use the marker-to-peak function to set the marker to peak of the signal.
- Use the marker-delta function to measure 20 dB down on left side of the signal.
- The 20dB Bandwidth is the delta reading in frequency between two markers.



6.2 Test Results:

Channel Frequency(MHz)	Data Rate(kbps)	20dB BW(kHz)	Limit(kHz)	Pass/Fail
902.75	125	172.5	\leq 500	Pass
	250	338	\leq 500	Pass
	500	490	\leq 500	Pass
914.75	125	167.5	\leq 500	Pass
	250	338	\leq 500	Pass
	500	490	\leq 500	Pass
927.25	125	173.8	\leq 500	Pass
	250	338	\leq 500	Pass
	500	490	\leq 500	Pass

- Carrier Frequency is: 902.75MHz, Data rate is: 125kbps



- Carrier Frequency is: 902.75MHz, Data rate is: 250kbps

12:30:49 DEC 03, 2007

OMNEX,MR900,S#:451053

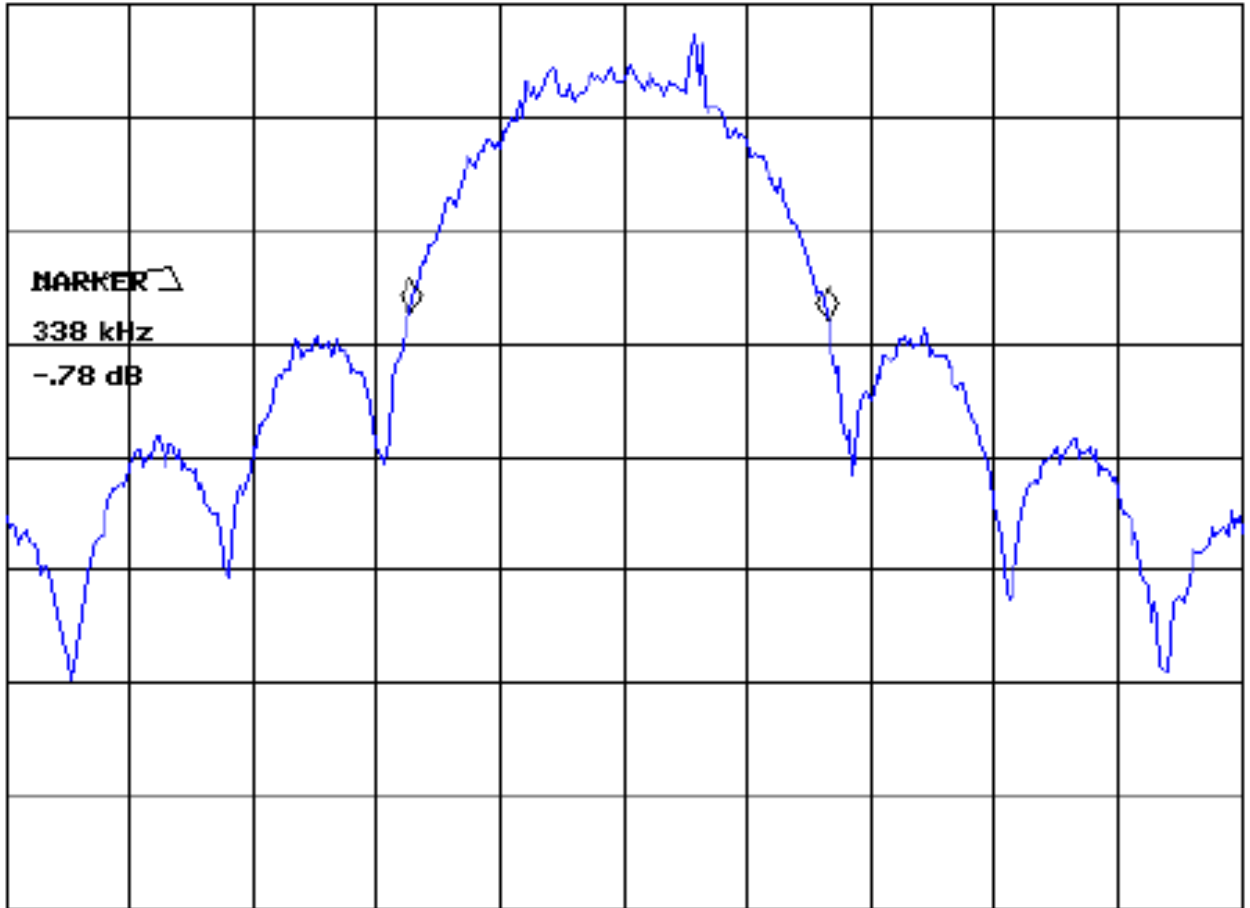
MKR 338 kHz

REF 30.0 dBm

AT 40 dB

-78 dB

PEAK
LOG
10
dB/
OFFST
.5
dB
UA SB
SC FC
CORR



CENTER 902.750 MHz

#RES BW 10 kHz

#VBW 10 kHz

SPAN 1.000 MHz

#SWP 200 msec

- Carrier Frequency is: 902.75MHz, Data rate is: 500kbps

14:28:27 DEC 06, 2007

OMNEX,MR900,S#:451053

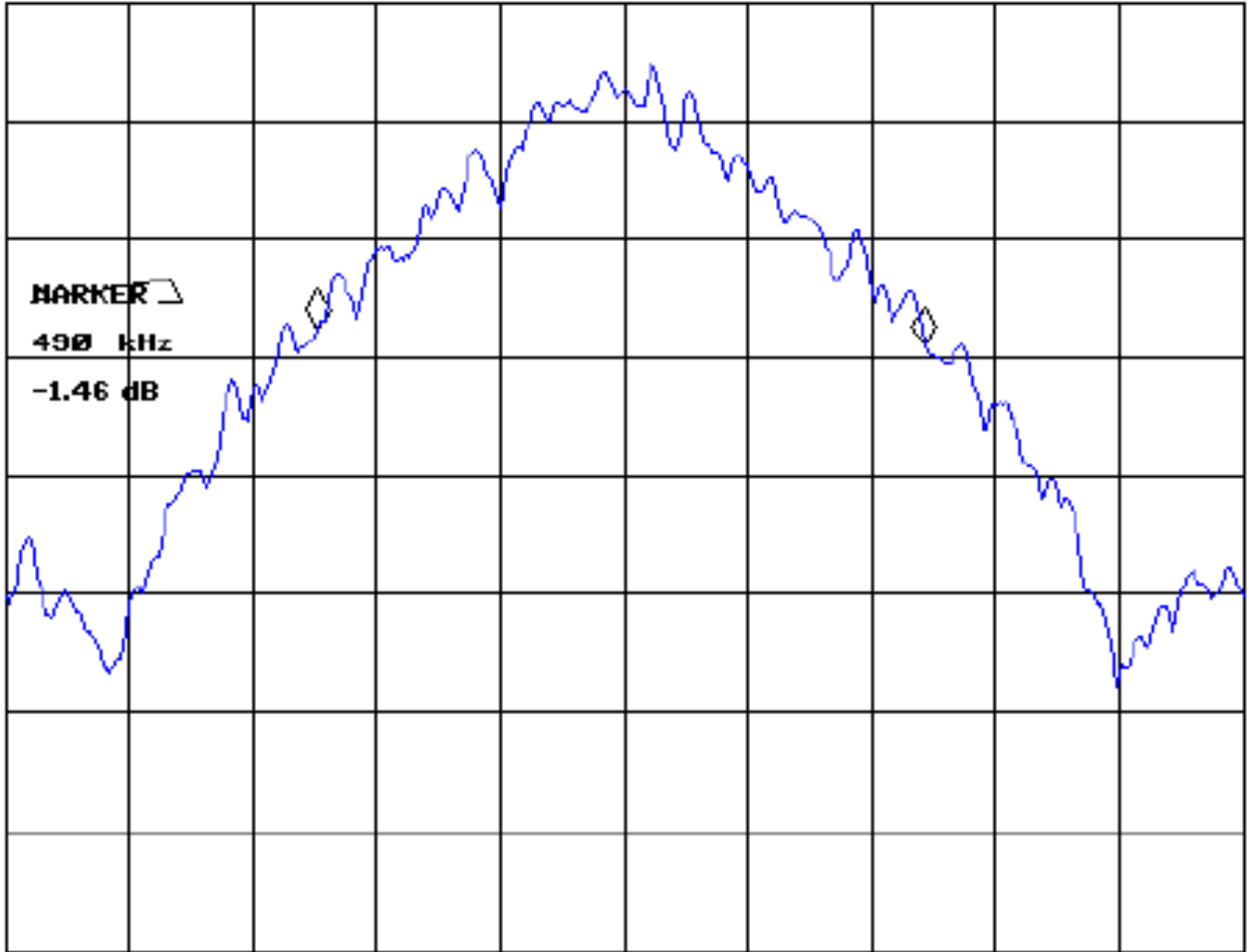
MKR 490 kHz

REF 30.0 dBm

AT 40 dB

-1.46 dB

PEAK
LOC
10
dB/
OFFST
.5
dB
MA SB
SC FC
CORR



CENTER 902.750 MHz

SPAN 1.000 MHz

#RES BW 10 kHz

UBW 10 kHz

#SWP 200 msec

- Carrier Frequency is: 914.75MHz, Data rate is: 125kbps

12:21:21 DEC 03, 2007

OMNEX,MR900,S#:451053

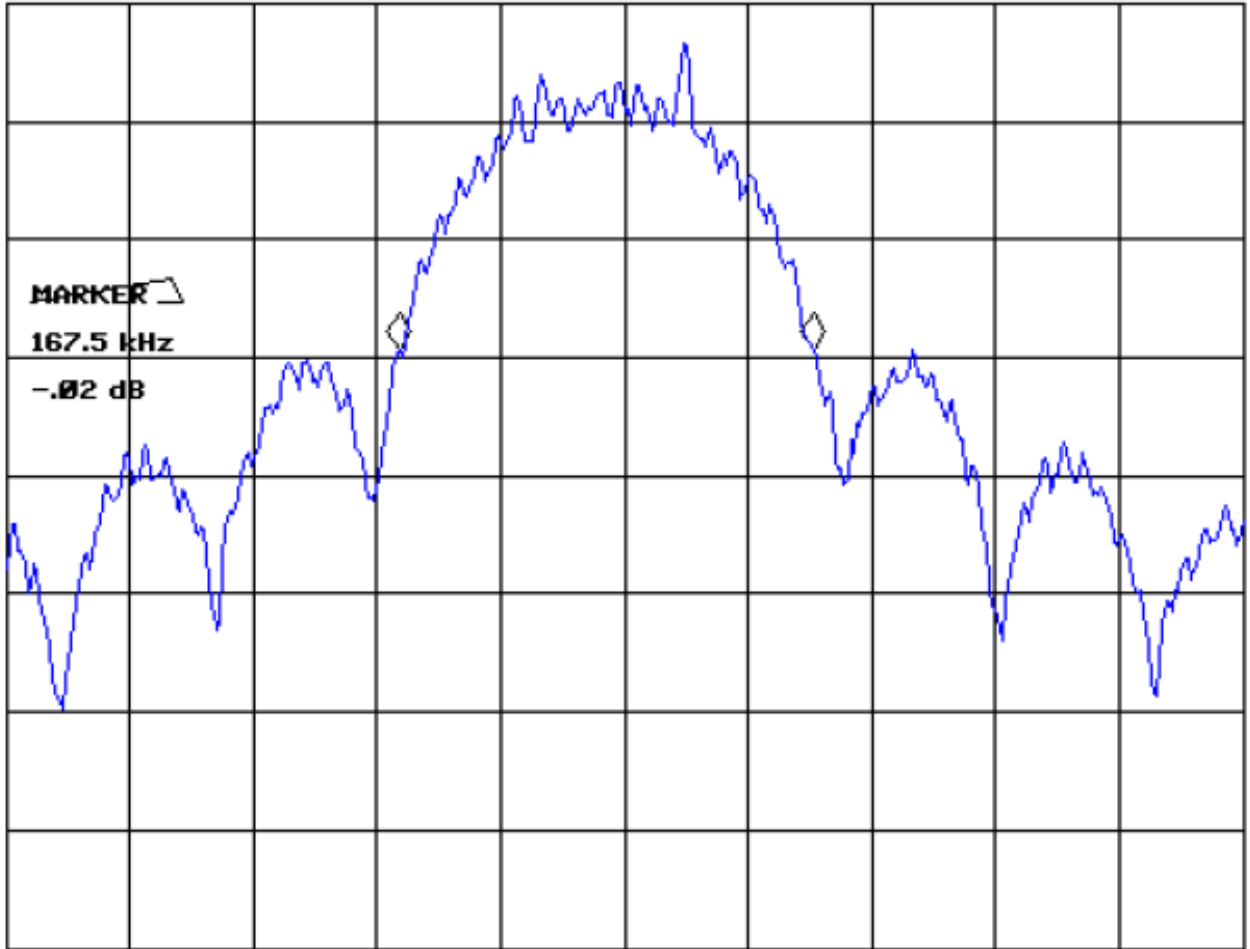
MKR 167.5 kHz

REF 30.0 dBm

AT 40 dB

-.02 dB

PEAK
LOG
10
dB/
OFFST
.4
dB
VA SB
SC FC
CORR



CENTER 914.7500 MHz

SPAN 500.0 kHz

#RES BW 3.0 kHz

#UBW 3 kHz

#SWP 200 msec

- Carrier Frequency is: 914.75MHz, Data rate is: 250kbps

12:15:31 DEC 03, 2007

OMNEX,MR900,S#:451053

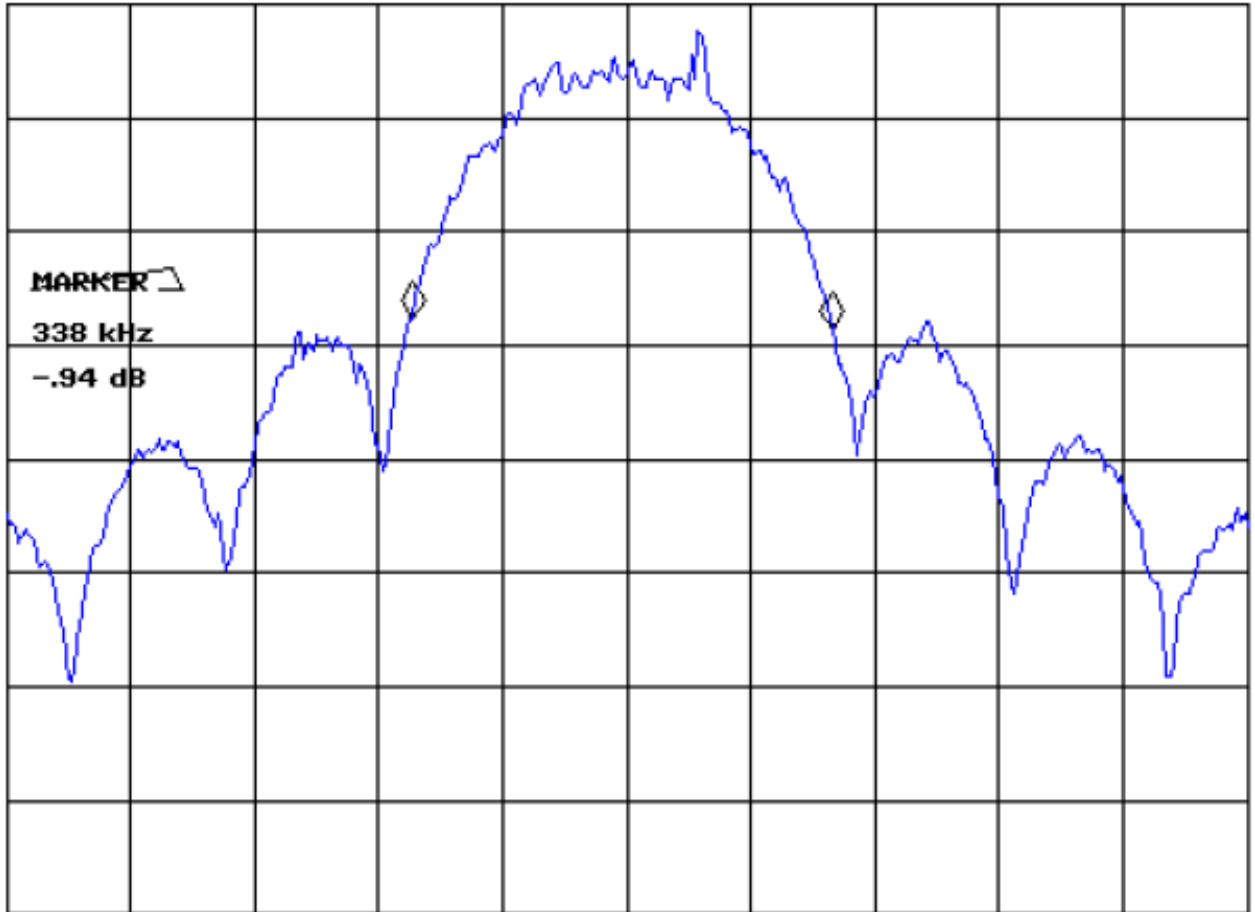
MKR 338 kHz

REF 30.0 dBm

AT 40 dB

-94 dB

PEAK
LOG
10
dB/
OFFST
.4
dB



CENTER 914.750 MHz

SPAN 1.000 MHz

#RES BW 10 kHz

#UBW 10 kHz

#SWP 200 msec

- Carrier Frequency is: 914.75MHz, Data rate is: 500kbps

14:27:11 DEC 06, 2007

OMNEX,MR900,S#:451053

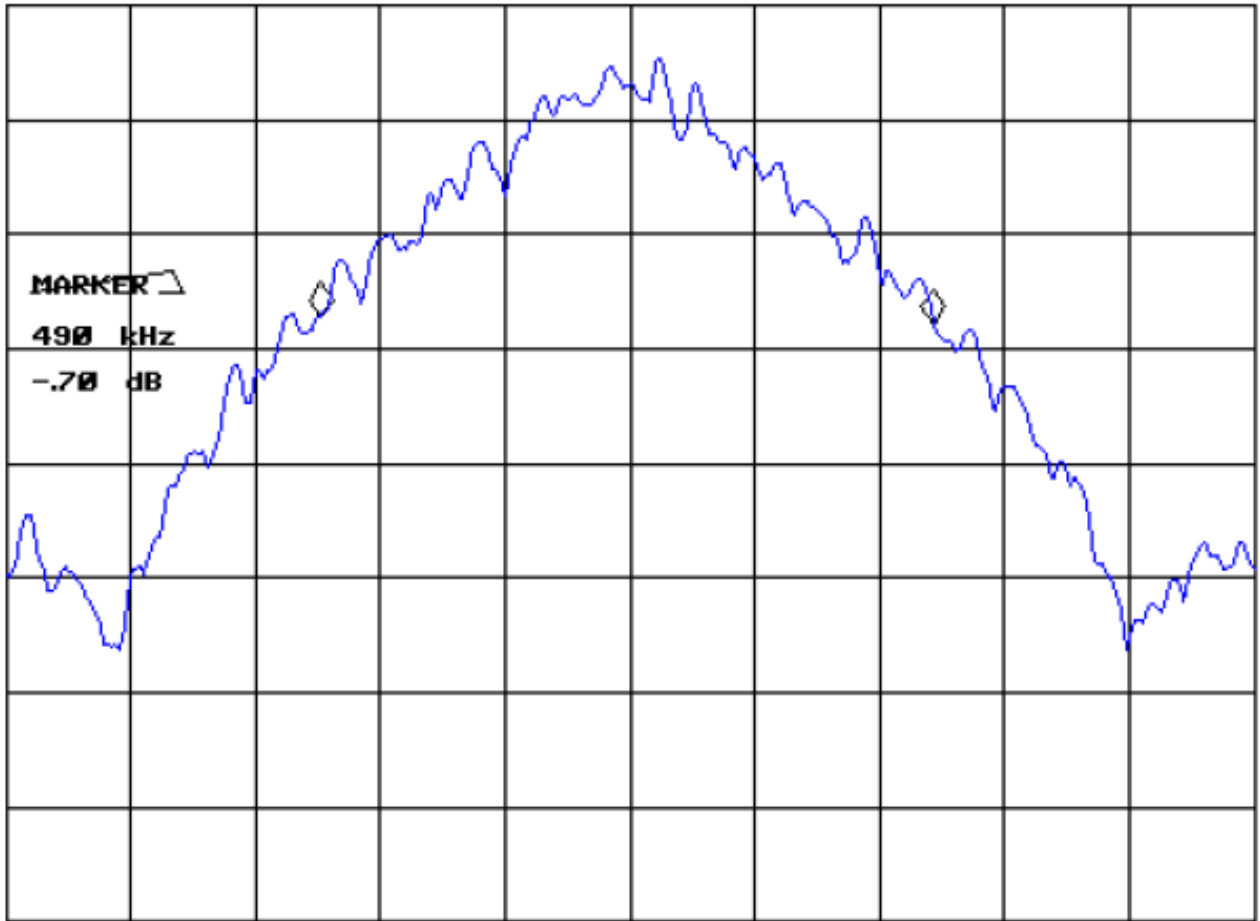
MKR 490 kHz

REF 30.0 dBm

AT 40 dB

-70 dB

PEAK
LOG
10
dB/
OFFST
.5
dB



CENTER 914.750 MHz

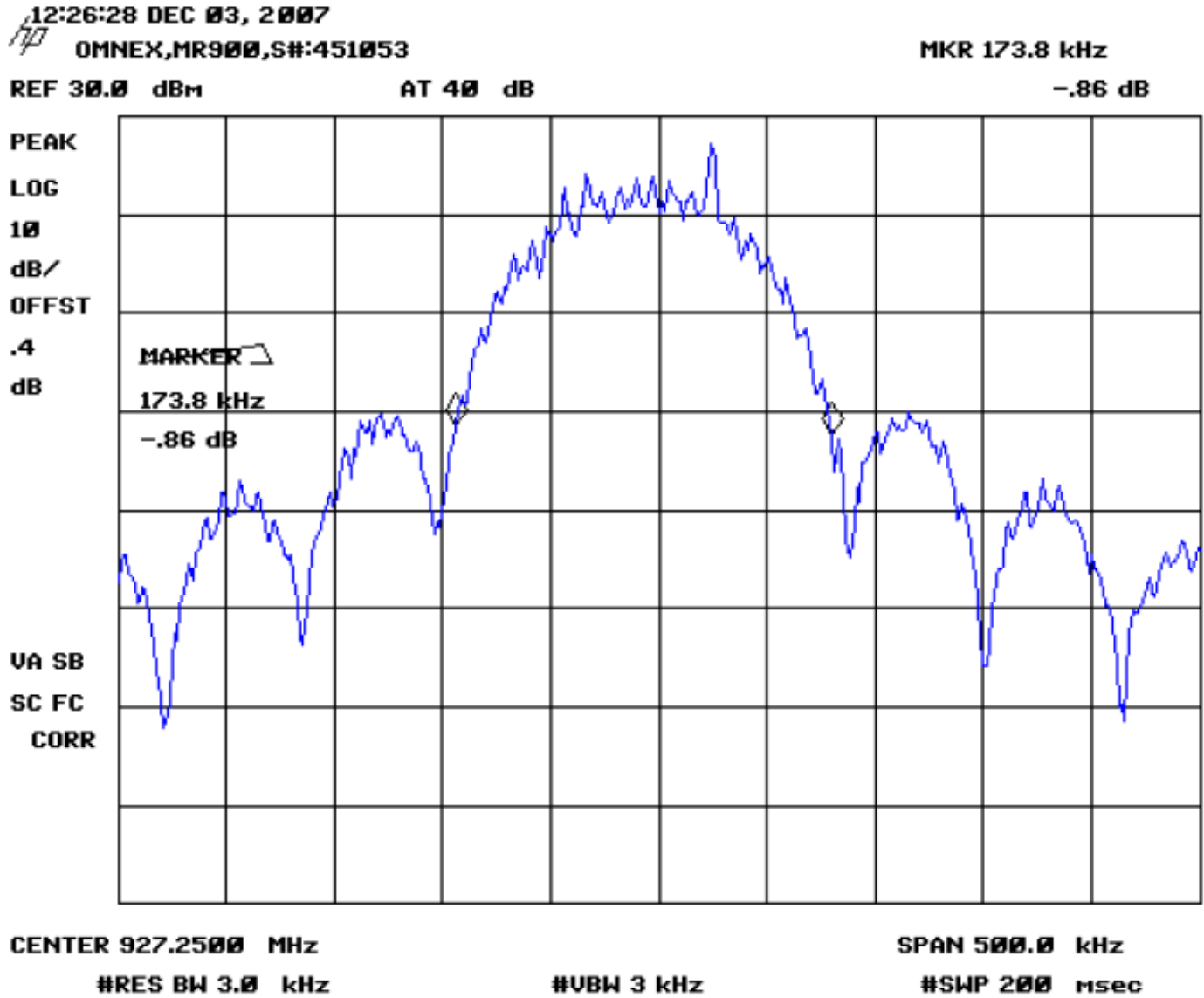
SPAN 1.000 MHz

#RES BW 10 kHz

UBW 10 kHz

#SWP 200 msec

- Carrier Frequency is: 927.25MHz, Data rate is: 125kbps



- Carrier Frequency is: 927.25MHz, Data rate is: 250kbps

12:04:05 DEC 03, 2007

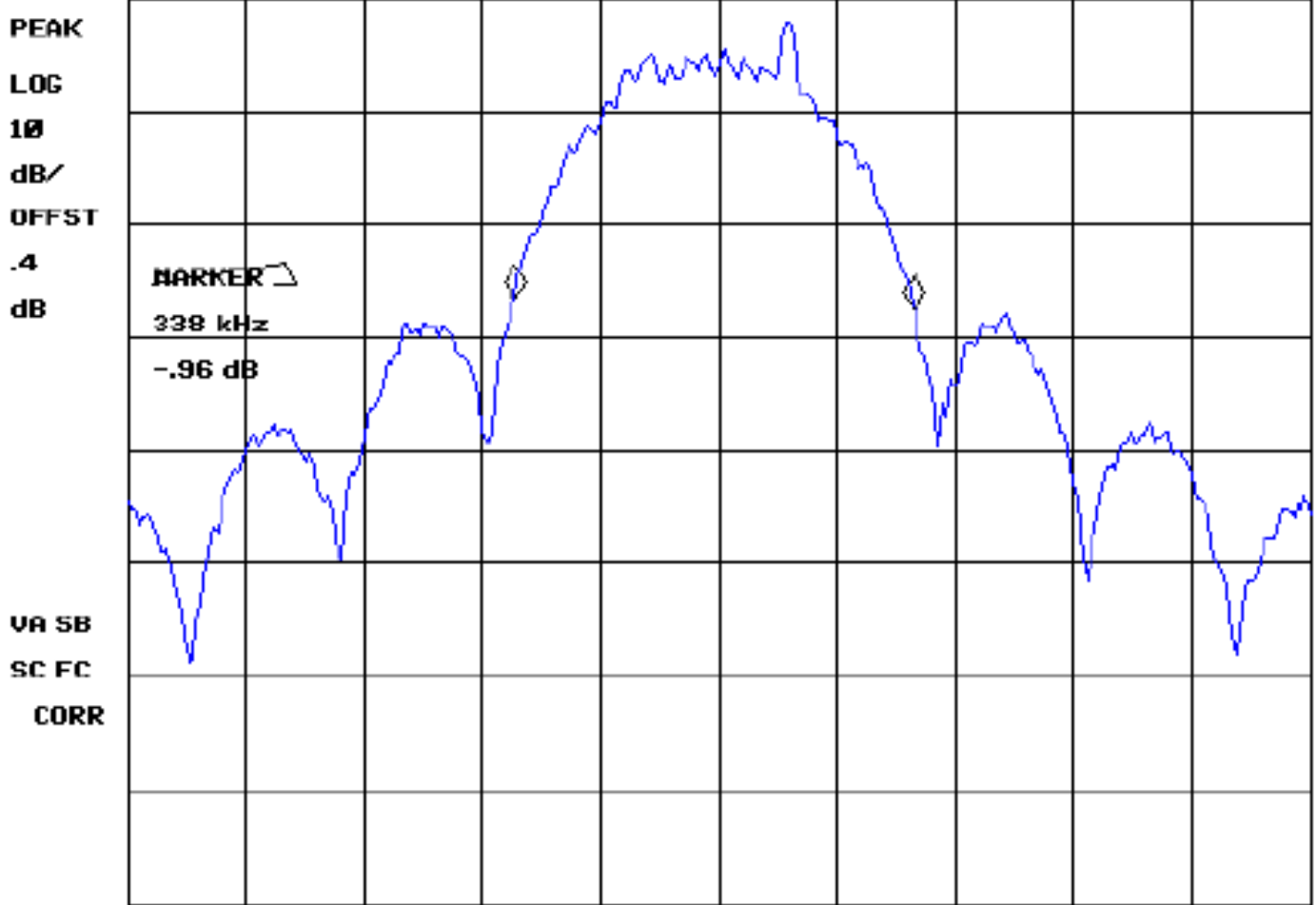
OMNEX,MR900,S#451053

MKR 338 kHz

REF 30.0 dBm

AT 40 dB

-.96 dB



CENTER 927.250 MHz

SPAN 1.000 MHz

#RES BW 10 kHz

#VBW 10 kHz

#SWP 200 msec

- Carrier Frequency is: 927.25MHz, Data rate is: 250kbps

14:23:53 DEC 06, 2007

OMNEX,MR900,S#:451053

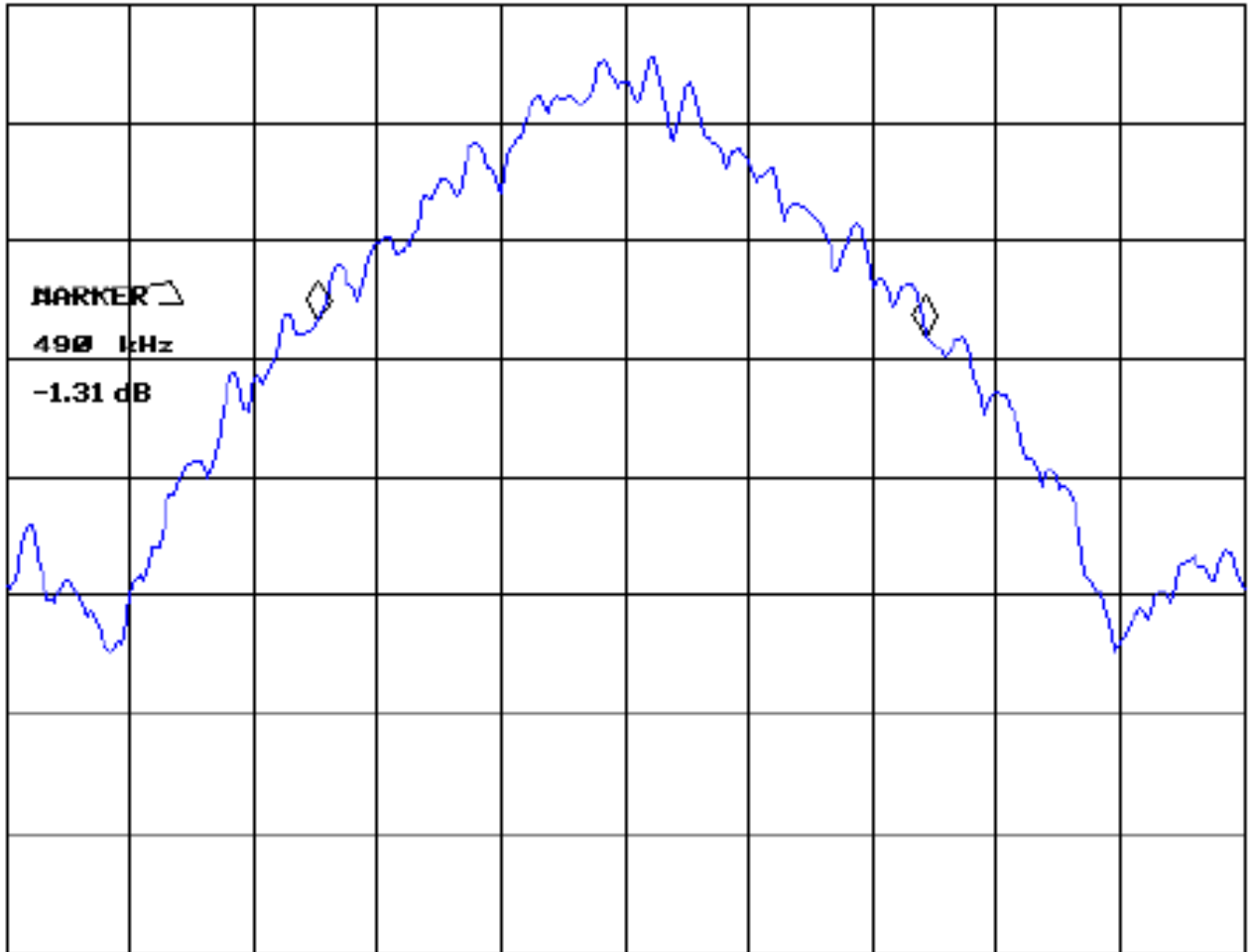
MKR 490 kHz

REF 30.0 dBm

AT 40 dB

-1.31 dB

PEAK
LOG
10
dB/
OFFST
.5
dB
MA SB
SC FC
CORR



CENTER 927.250 MHz

SPAN 1.000 MHz

#RES BW 10 kHz

UBW 10 kHz

#SWP 200 msec

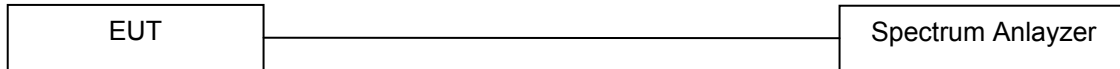
7 Channel Separation

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.

7.1 Test Procedure:

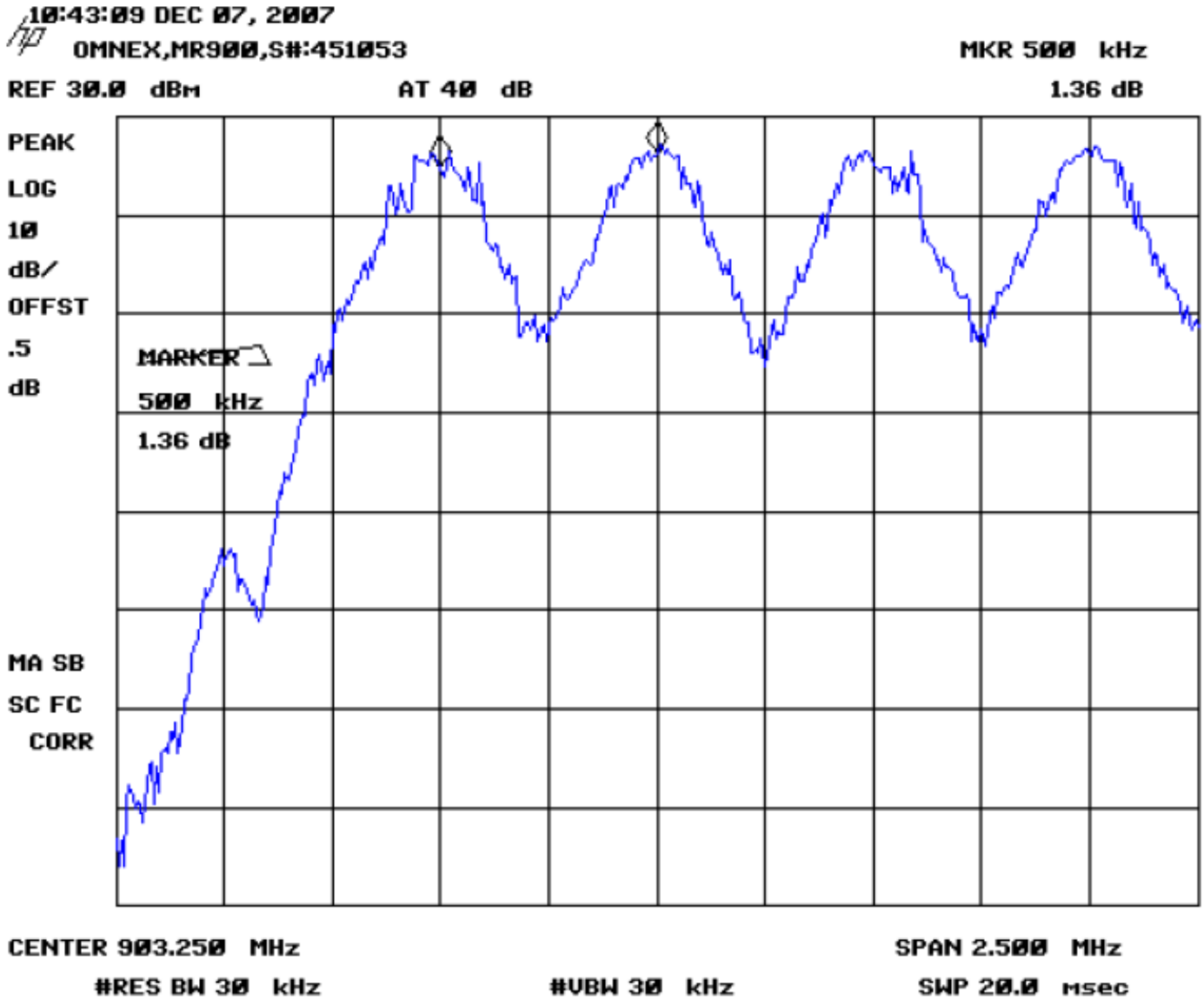
- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter shall be transmitting at its maximum data rate.
- The following measurements were made with
 - Span = wide enough to capture the peaks of two adjacent channels
 - RBW \geq 1% of the span
 - VBW \geq RBW
 - Sweep = auto
 - Detector Function = peak
 - Trace = max hold
- Allow the trace to stabilize.
- Use the marker-to-peak function to set the marker to peak of the signal.
- Use the marker-delta function to next peak of the signal.
- The Channel Separation is the delta reading in frequency between two markers.



7.2 Test Results:

Centre Frequency(MHz)	Channel Separation (kHz)	Limit(kHz)	Pass/Fail
903.00	500	\geq 490	Pass
914.50	500	\geq 490	Pass
927.00	500	\geq 490	Pass

- Centre Frequency is: 903.25MHz



- Centre Frequency is: 914.75MHz

10:48:06 DEC 07, 2007

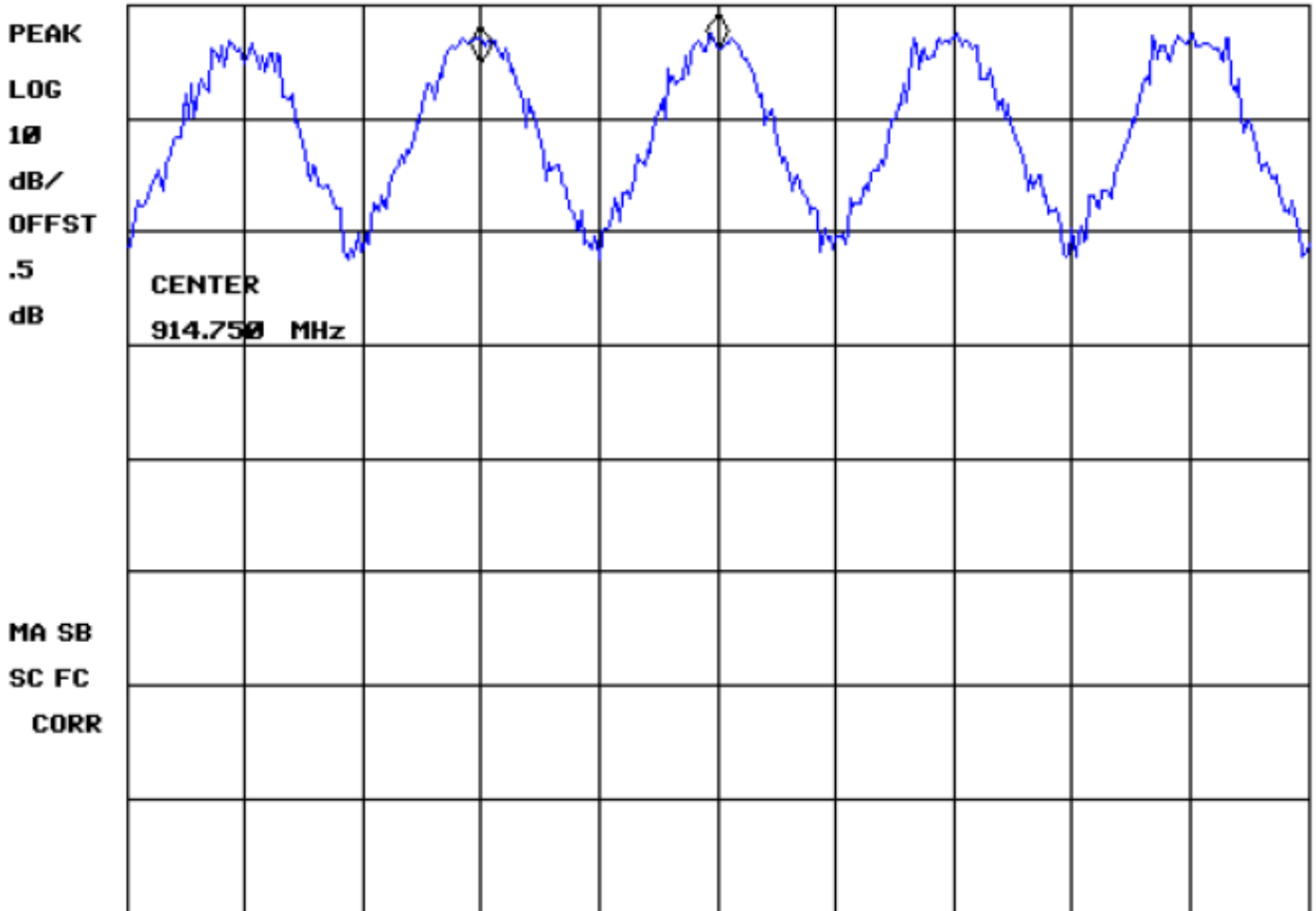
OMNEX,MR900,S#:451053

MKR 12.000 MHz

REF 30.0 dBm

AT 40 dB

1.28 dB



CENTER 914.750 MHz

SPAN 2.500 MHz

#RES BW 30 kHz

#UBW 30 kHz

SWP 20.0 msec

- Centre Frequency is: 926.75MHz

10:53:31 DEC 07, 2007

OMNEX,MR900,S#:451053

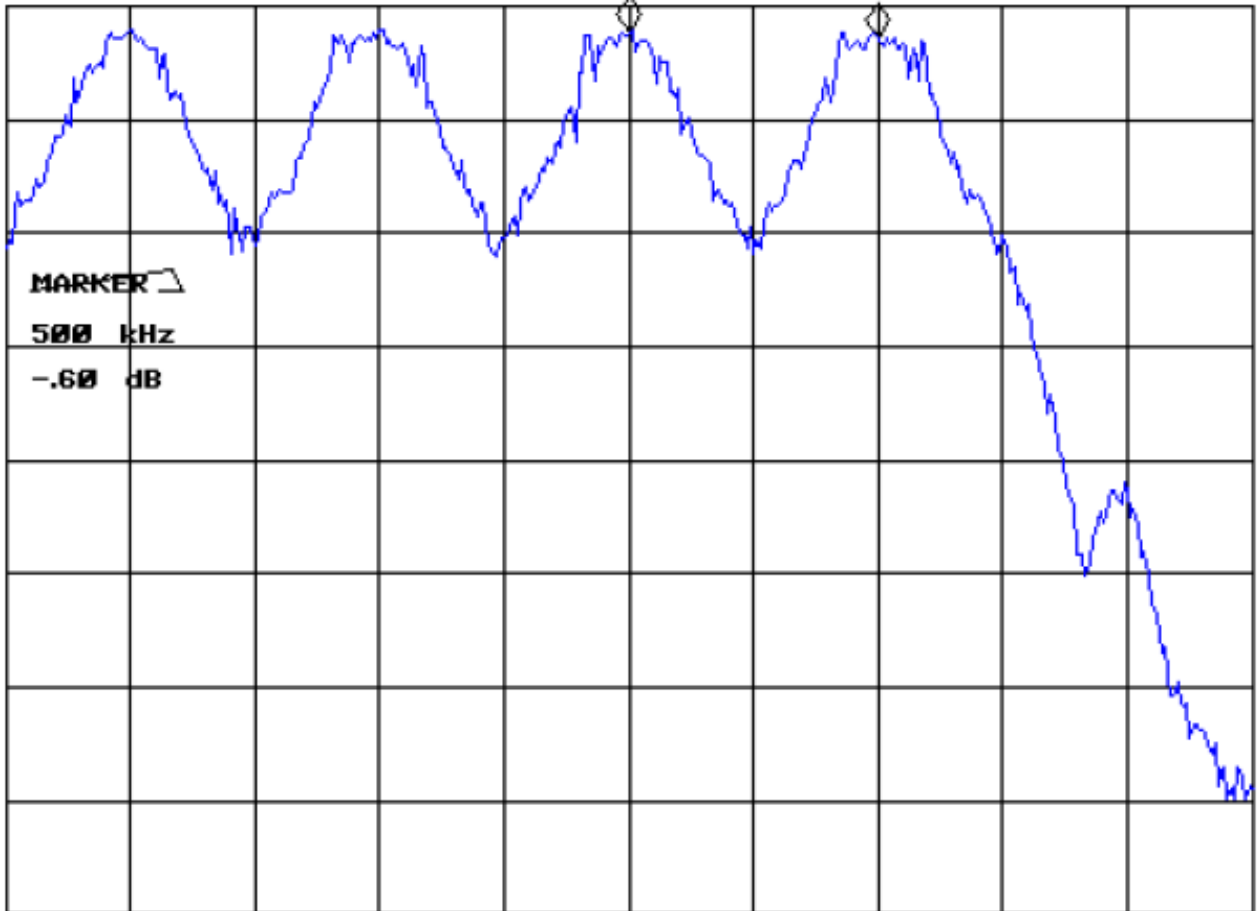
MKR 500 kHz

REF 30.0 dBm

AT 40 dB

-.60 dB

PEAK
LOG
10
dB/
OFFST
.5
dB



CENTER 926.750 MHz

SPAN 2.500 MHz

#RES BW 30 kHz

#UBW 30 kHz

SWP 20.0 msec

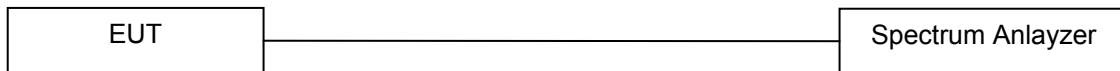
8 Number of Channels

FCC15.247(a)(1)

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.

8.1 Test Procedures:

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter shall be transmitting at its maximum data rate.
- The following measurements were made with
 - Span = the frequency band of operation
 - RBW \geq 1% of the span
 - VBW \geq RBW
 - Sweep = auto
 - Detector Function = peak
 - Trace = max hold
- Allow the trace to stabilize.



8.2 Test Results:

Frequency range (MHz)	Channel Number	Limit	Pass/Fail
902.75 to 927.25	50	\geq 50	Pass

13:15:42 DEC 03, 2007

OMNEX,MR900,S#:451053

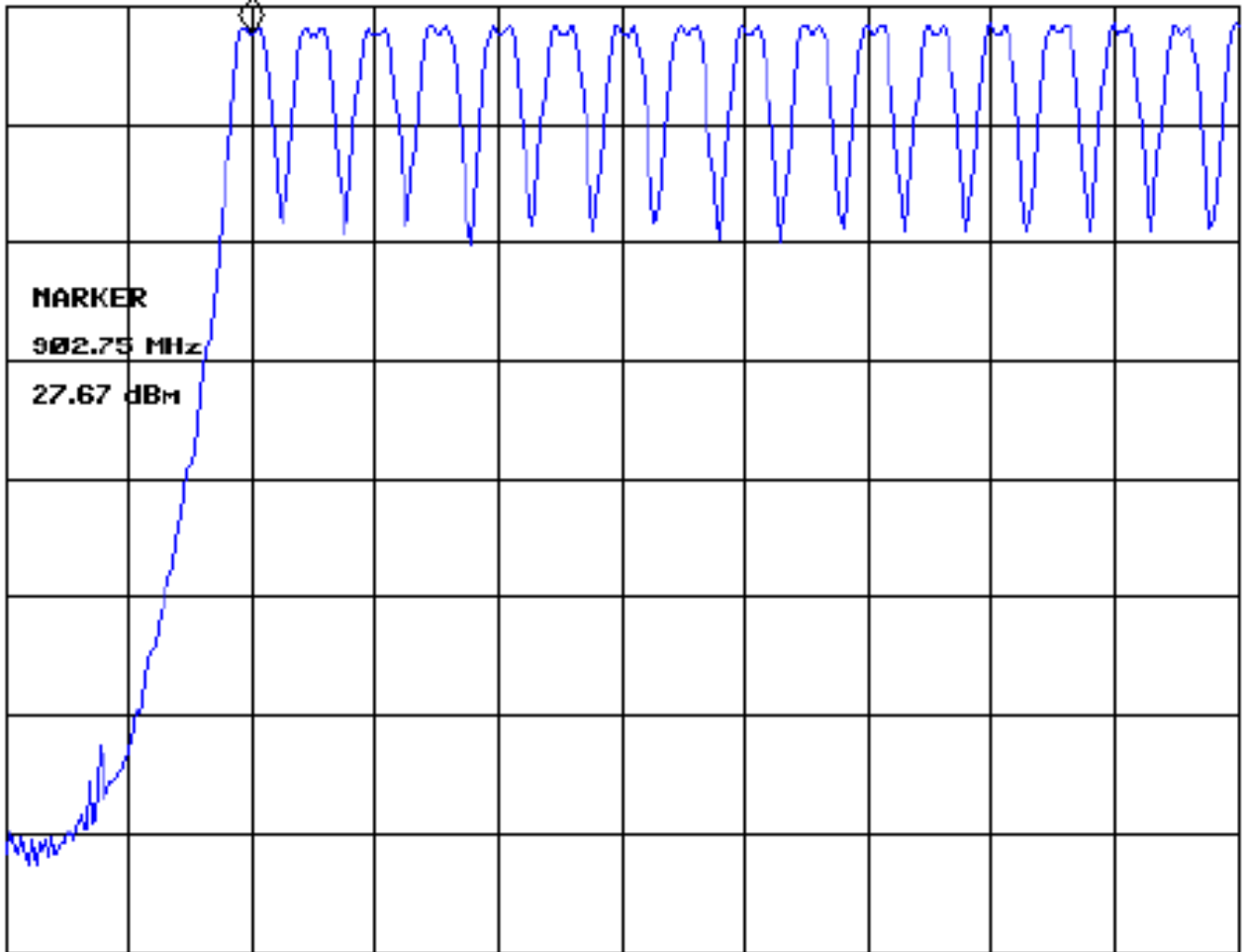
MKR 902.75 MHz

REF 30.0 dBm

AT 40 dB

27.67 dBm

PEAK
LOC
10
dB/
OFFST
.5
dB



CENTER 905.75 MHz

SPAN 10.00 MHz

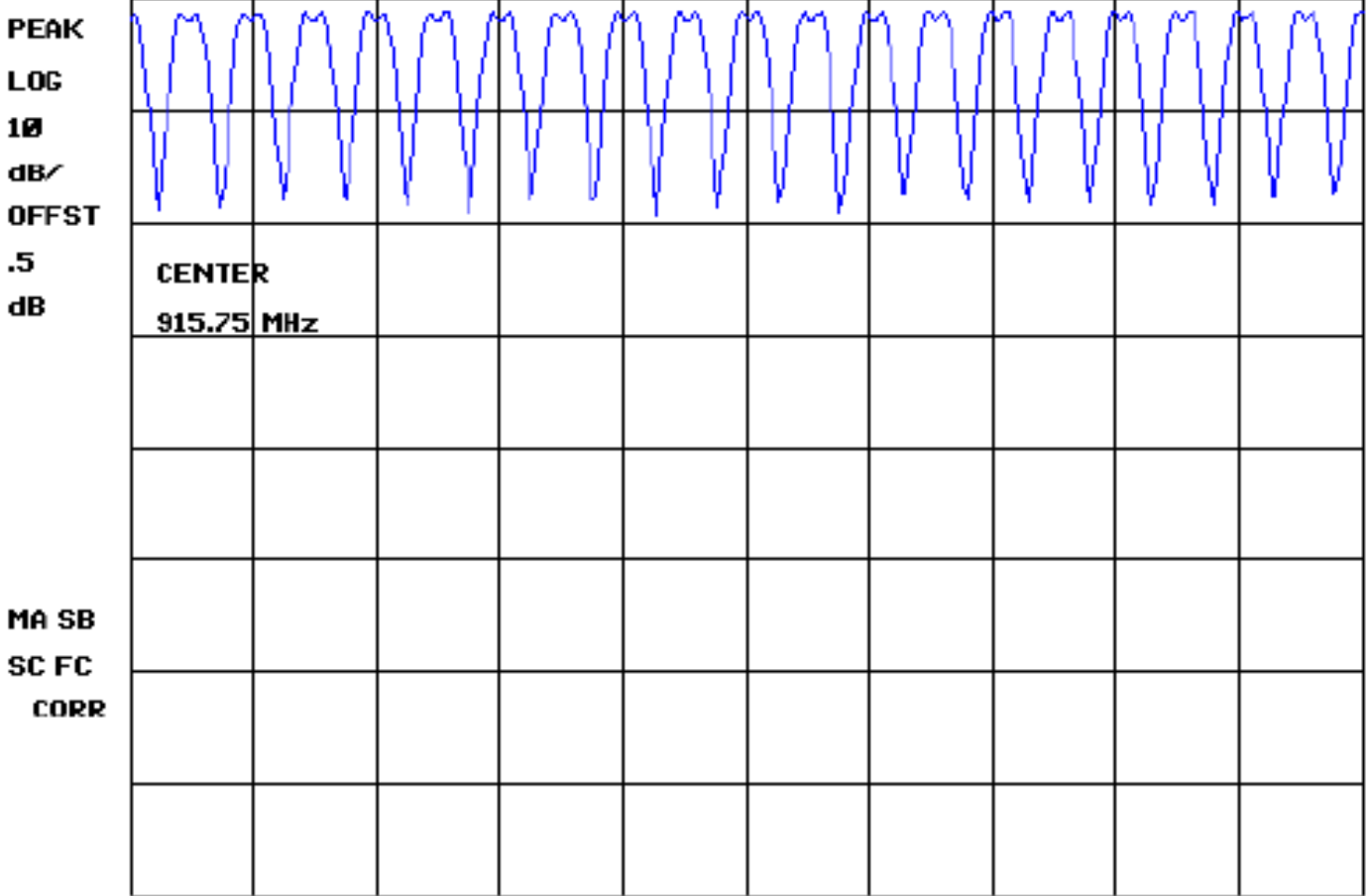
#RES BW 100 kHz

#VBW 100 kHz

#SWP 200 msec

13:19:55 DEC 03, 2007
OMNEX,MR900,SW451053

REF 30.0 dBm AT 40 dB



CENTER 915.75 MHz

#RES BW 100 kHz

#VBW 100 kHz

SPAN 10.00 MHz

#SWP 200 msec

13:24:41 DEC 03, 2007

OMNEX,MR900,S#:451053

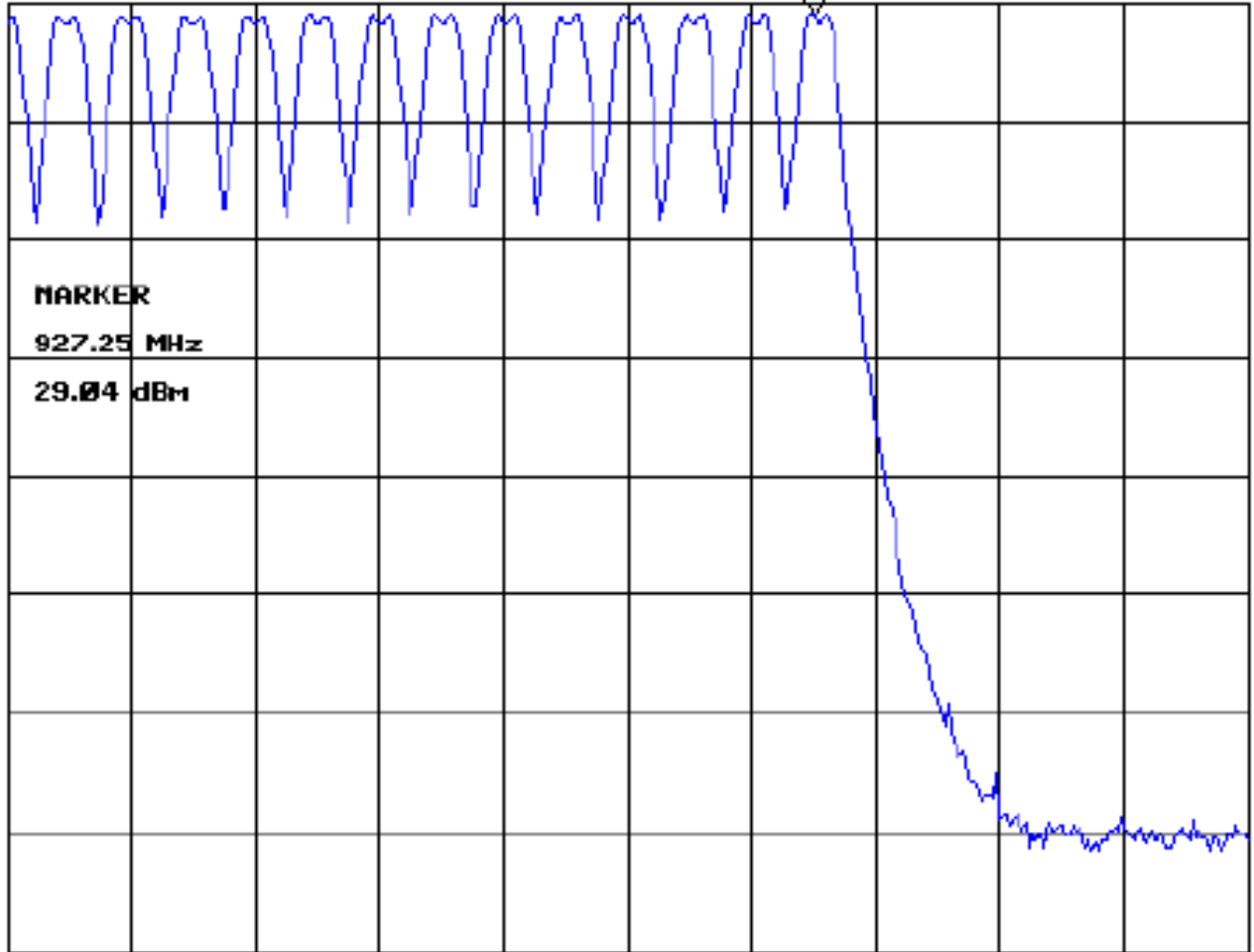
MKR 927.25 MHz

REF 30.0 dBm

AT 40 dB

29.04 dBm

PEAK
LOG
10
dB/
OFFST
.5
dB



CENTER 925.75 MHz

#RES BW 100 kHz

#VBW 100 kHz

SPAN 10.00 MHz

#SWP 200 msec

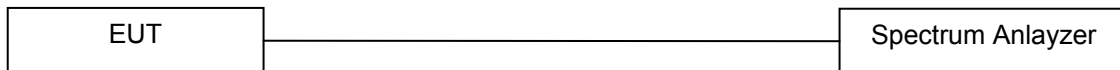
9 Time of Occupancy (Dwell Time)

FCC15.247(a)(1)

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.

9.1 Test Procedures

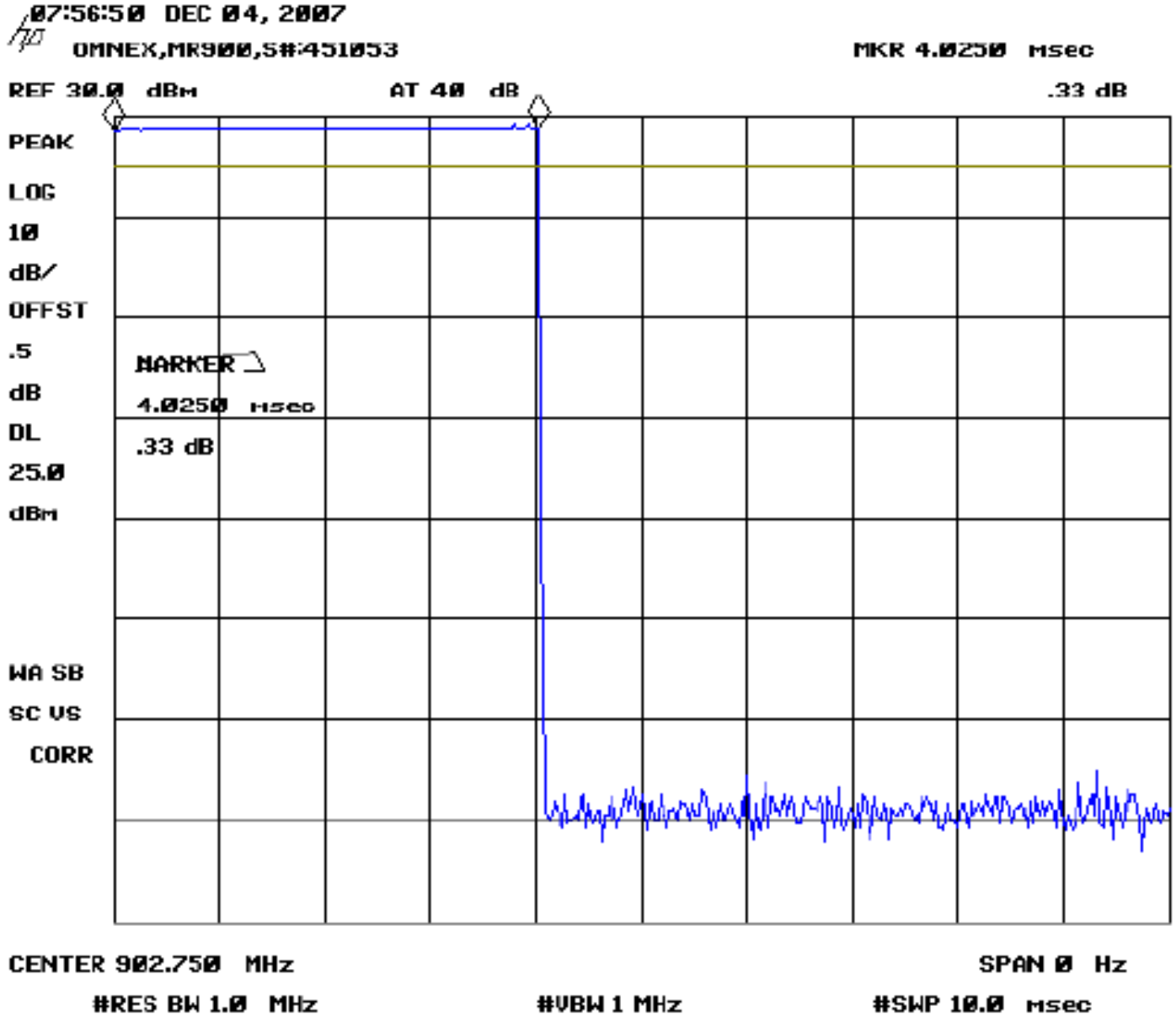
- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter shall be transmitting at its maximum data rate.
- The following measurements were made with
 - Span = 0Hz centered on a hopping channel
 - RBW = 1MHz
 - VBW ≥ RBW
 - Sweep = as necessary to capture the entire dwell time per hopping channel
 - Detector Function = peak
 - Trace = Single trace up to capturing the whole range of signal
- Use the marker function to set the marker to top of left-end of the signal.
- Use the marker-delta function to set the marker to top of right-end of the signal.
- The Dwell Time is the delta reading in time between two markers.



9.2 Test Results:

Channel Frequency(MHz)	Dwell Time (msec)	Limit(msec)	Pass/Fail
902.75	116.725	< 400	Pass
914.75	116.725	< 400	Pass
927.25	116.725	< 400	Pass

- Carrier Frequency is: 902.75MHz



10:29:14 DEC 07, 2007

OMNEX,MR900,S#:451053

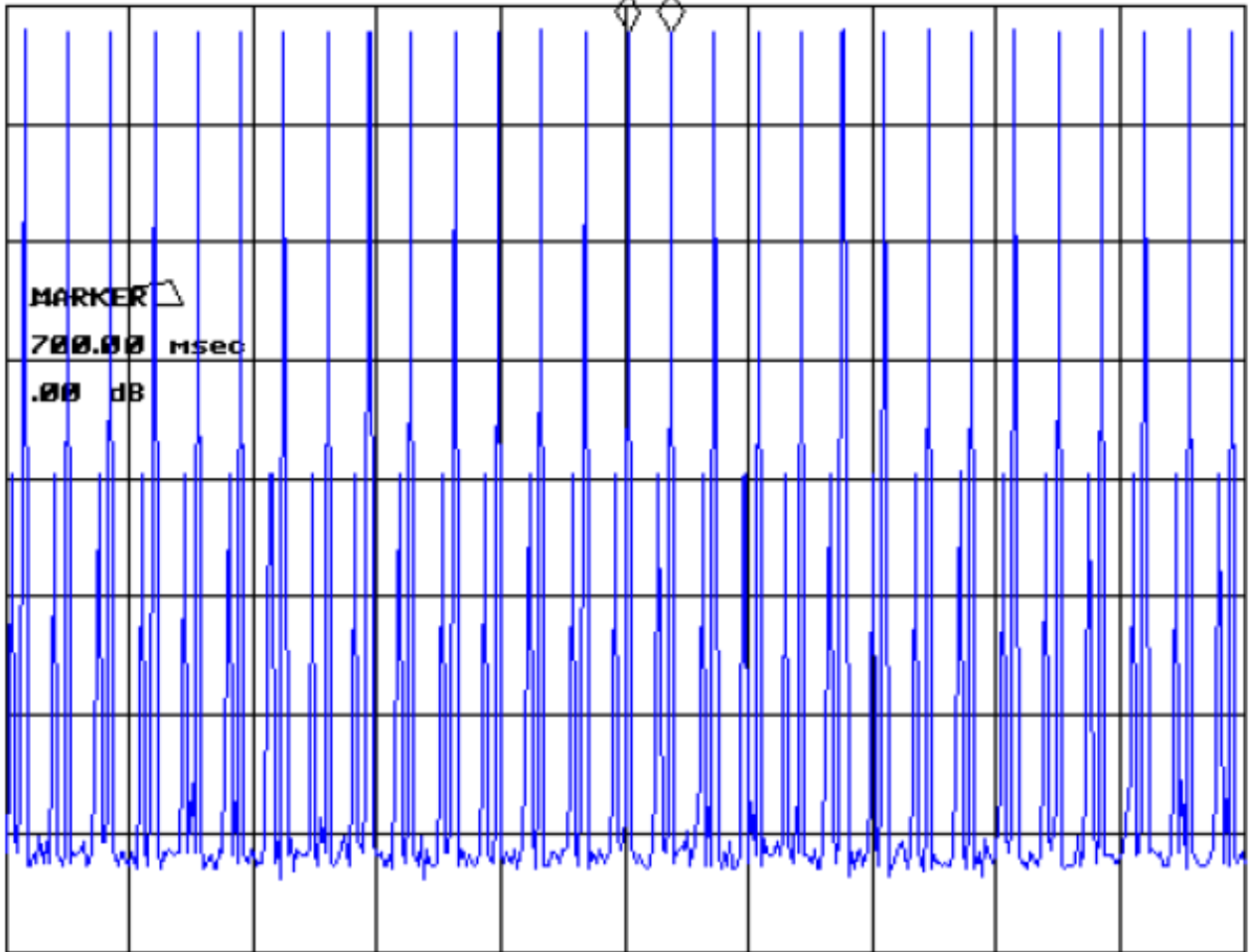
MKR 700.00 msec

REF 30.0 dBm

AT 40 dB

.00 dB

PEAK
LOG
10
dB/
OFFST
.5
dB



CENTER 902.750 MHz

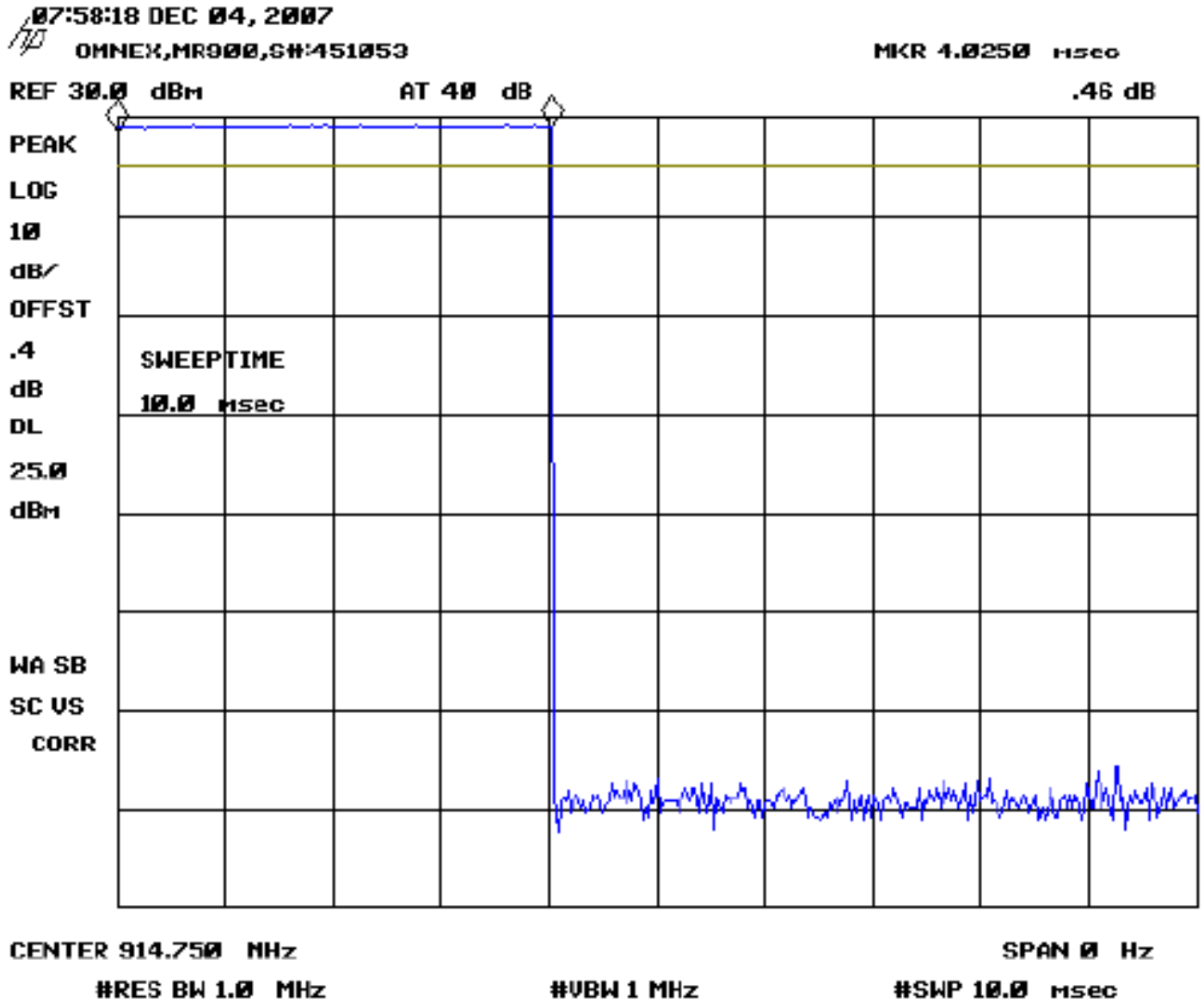
SPAN 0 Hz

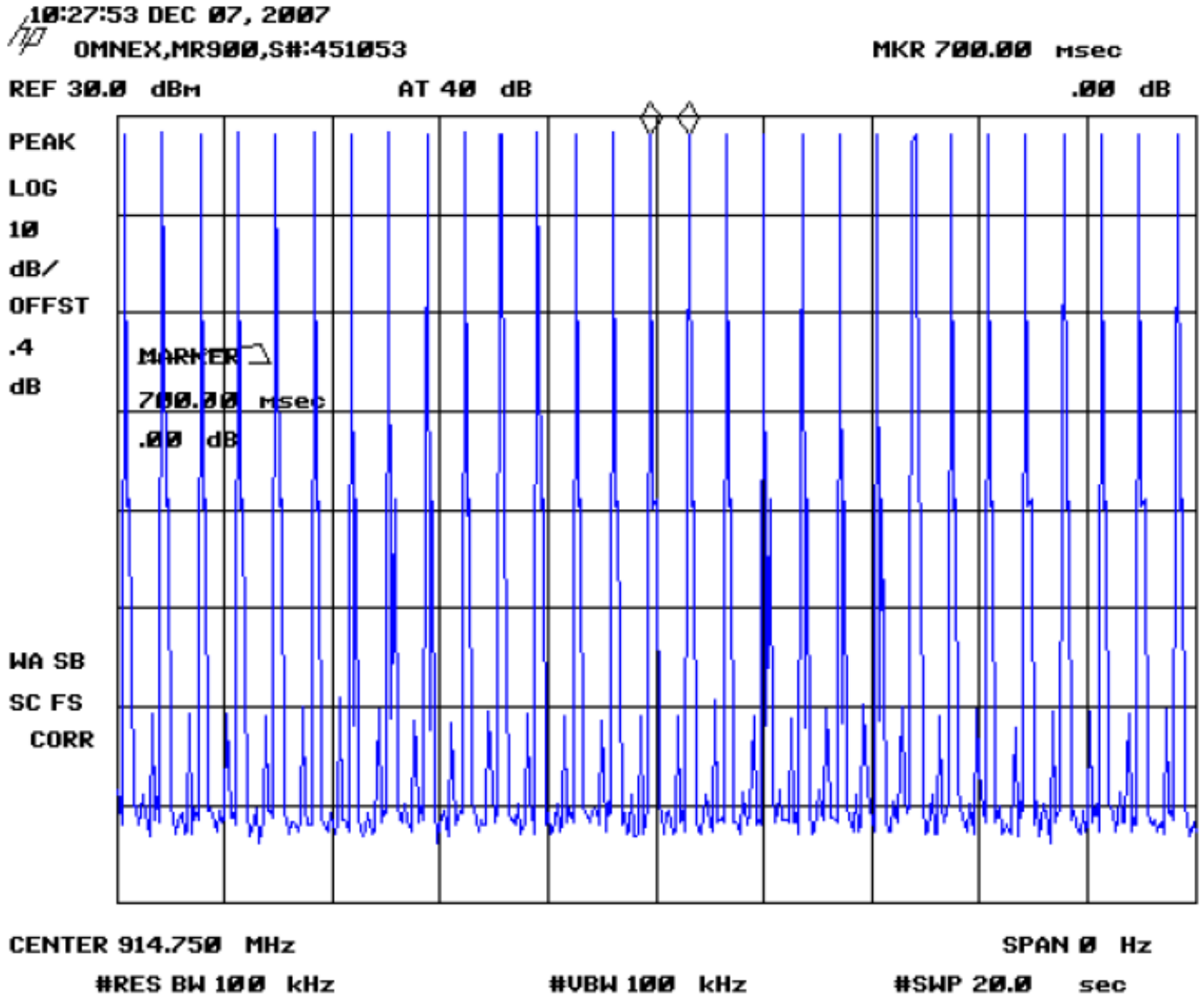
#RES BW 100 kHz

#VBW 100 kHz

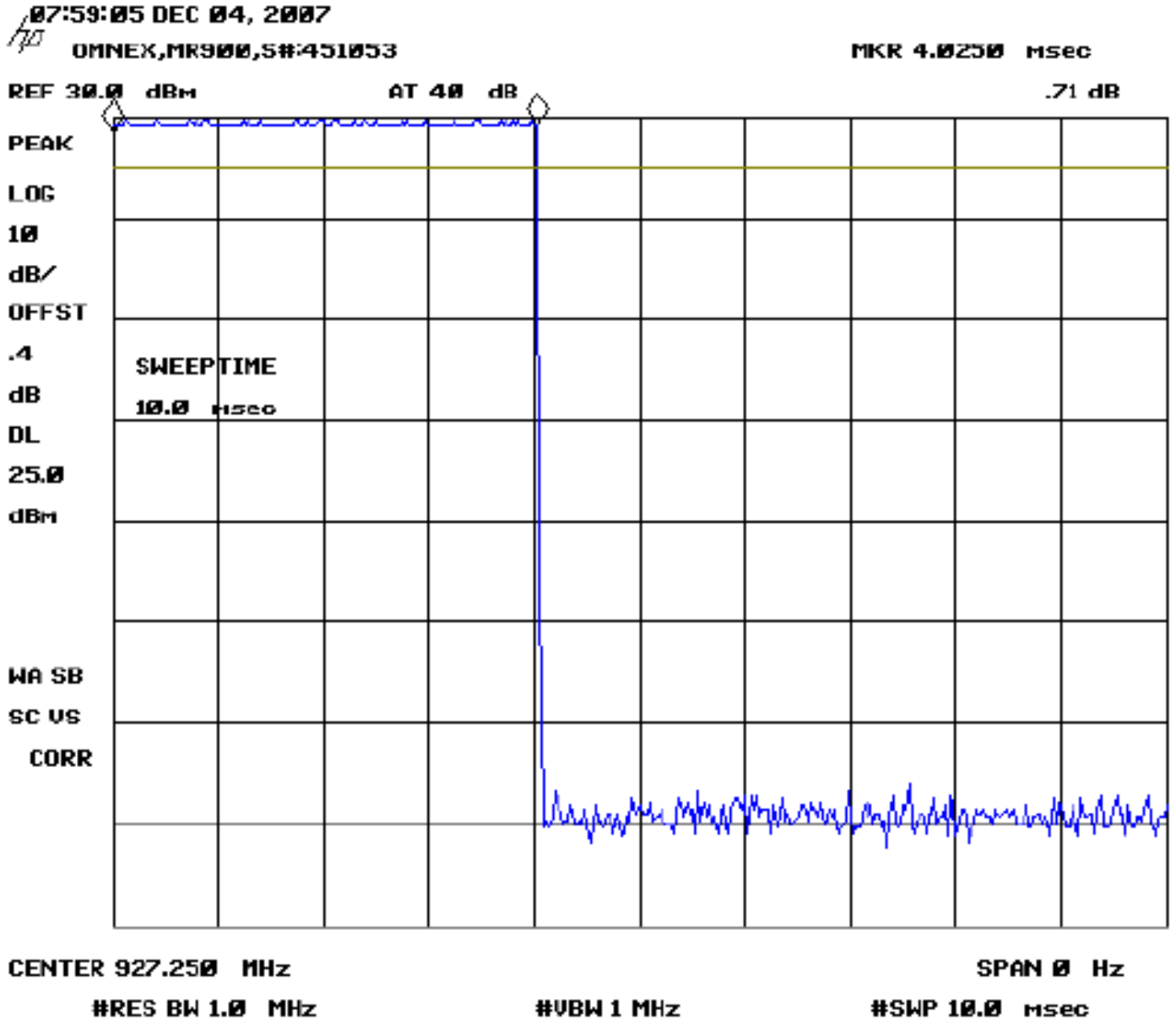
#SWP 20.0 sec

- Carrier Frequency is: 914.75MHz





- Carrier Frequency is: 927.25MHz



10:26:42 DEC 07, 2007

OMNEX,MR900,S#:451053

MKR 700.00 msec

REF 30.0 dBm

AT 40 dB

-.02 dB

PEAK

LOG

10

dB/

OFFST

.4

dB

MARKER

700.00 msec

-.02 dB

WA SB

SC FS

CORR

CENTER 914.750 MHz

SPAN 0 Hz

#RES BW 100 kHz

#UBW 100 kHz

#SWP 20.0 sec

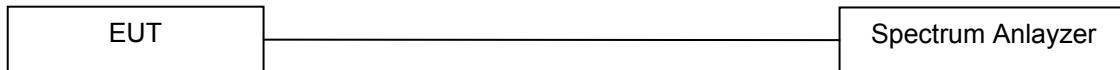
10 Maximum peak conducted output power

FCC15.247(b)(2)

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

10.1 Test Procedures

- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter shall be transmitting at its maximum data rate.
- The following measurements were made with
 - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
 - RBW > the 20 dB bandwidth of the emission being measured
 - VBW ≥ RBW
 - Sweep = Auto
 - Detector Function = peak
 - Trace = Max Hold
- Allowed the trace to stabilize.
- Use the marker-to-marker function to set the marker to the peak of the signal.
- The indicated level is the peak conducted output power (with the addition of the external attenuation and cable loss).



10.2 Test Results:

Channel Frequency(MHz)	Peak Power(W)	Limit(W)	Pass/Fail
902.75	0.66834	≤ 1	Pass
914.75	0.73790	≤ 1	Pass
927.25	0.80168	≤ 1	Pass

- Carrier frequency is: 902.75MHz

11:45:53 DEC 03, 2007

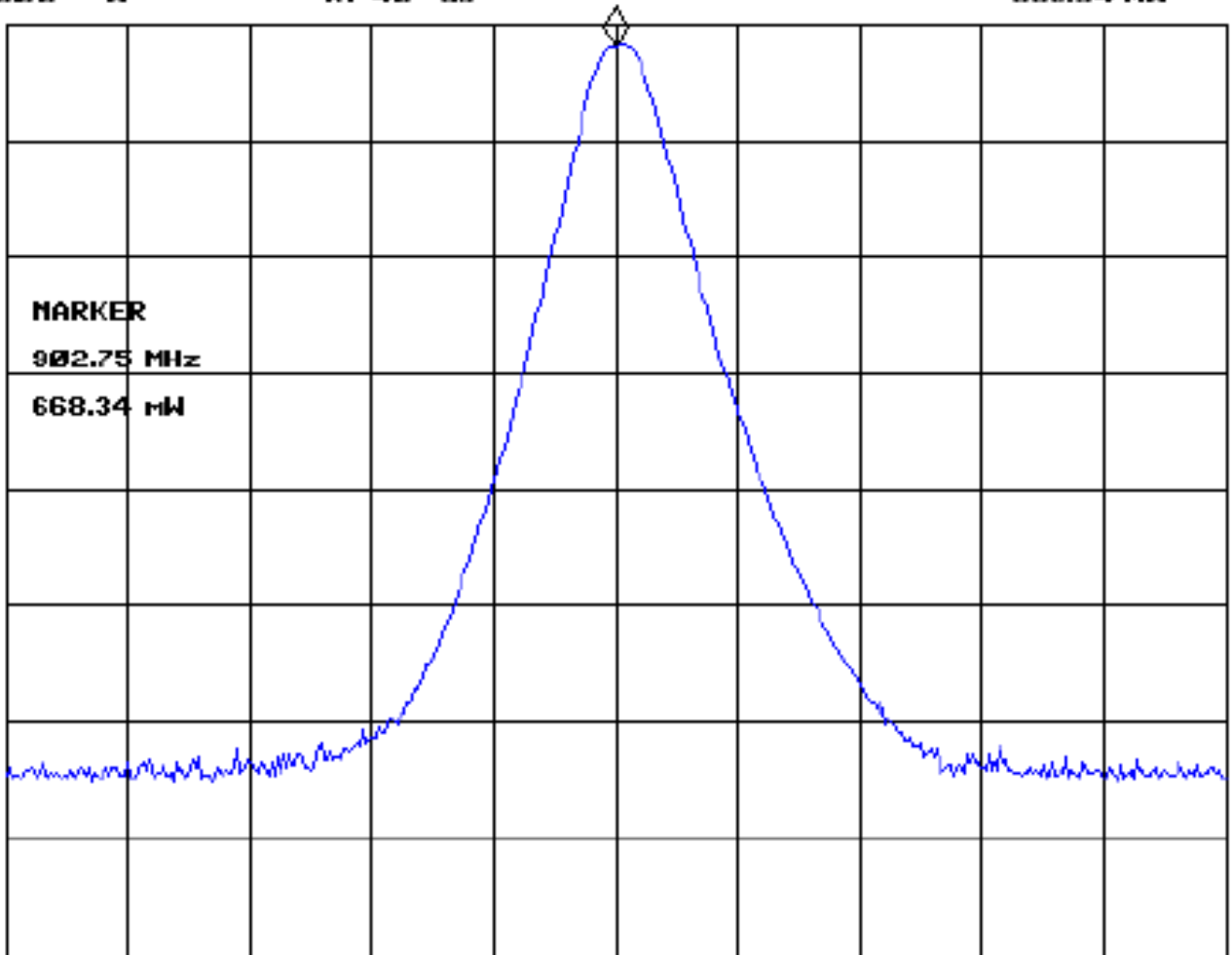
OMNEX,MR900,S#:451053

MKR 902.75 MHz

REF 1.0000 W AT 40 dB

668.34 mW

PEAK
LOG
10
dB/
OFFST
.5
dB
MA SB
SC FC
CORR



CENTER 902.75 MHz

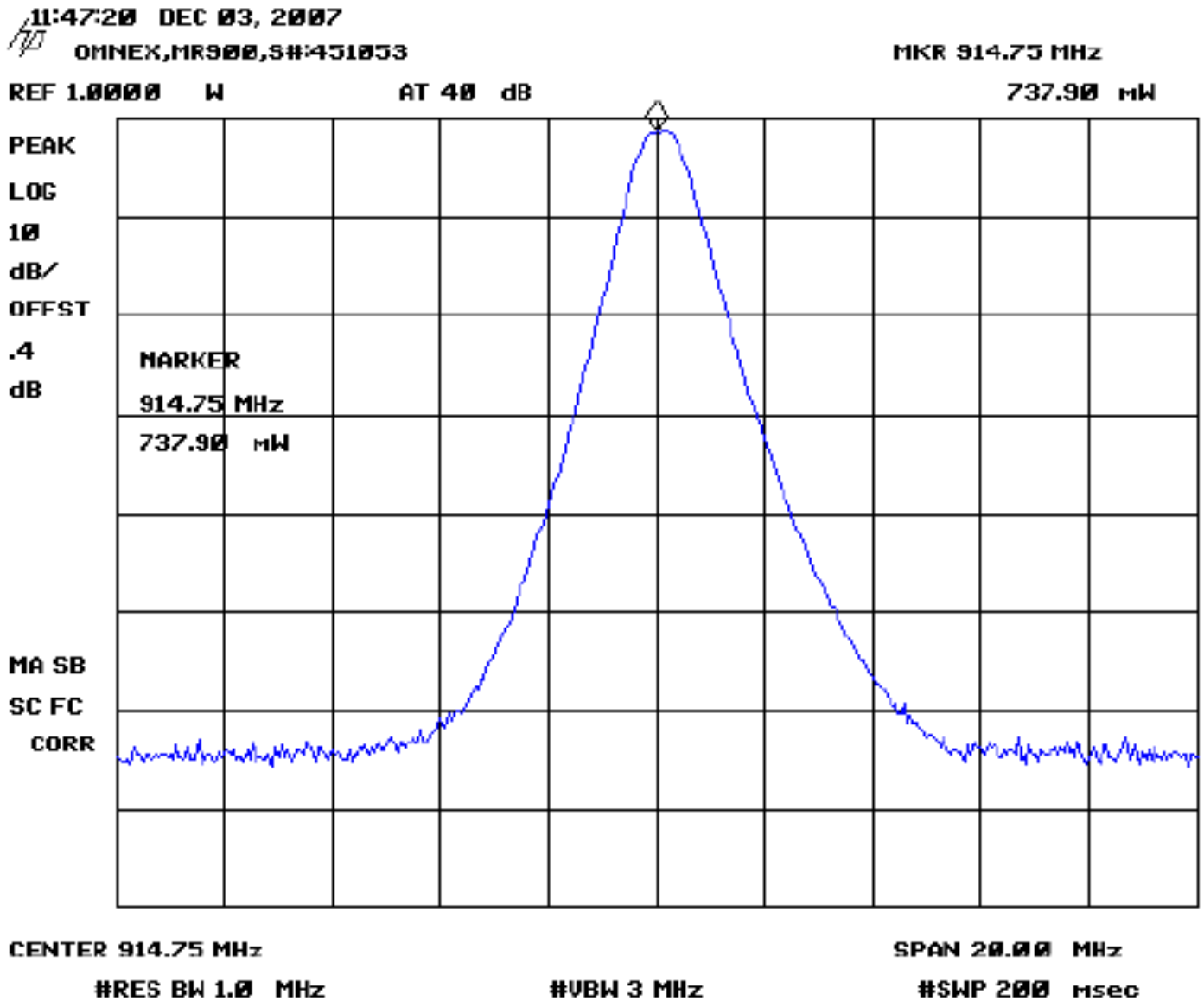
SPAN 20.00 MHz

#RES BW 1.0 MHz

#VBW 3 MHz

#SWP 200 msec

- Carrier frequency is: 914.75MHz



- Carrier frequency is: 927.25MHz

11:48:42 DEC 03, 2007

OMNEX,MR900,S#451053

MKR 927.25 MHz

REF 1.0000 W

AT 40 dB

801.68 mW

PEAK

LOG

10

dB/

OFFST

.4

dB

MARKER

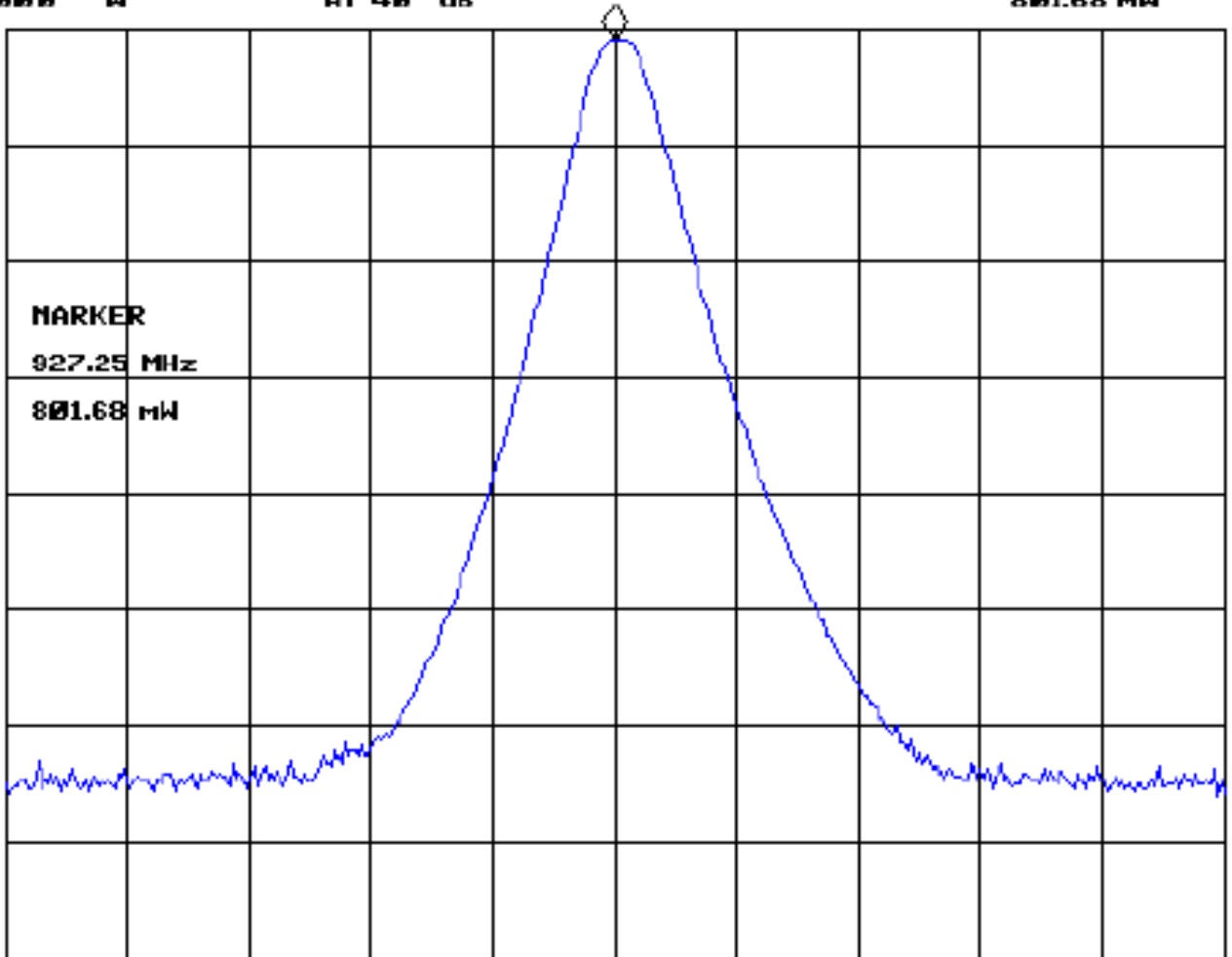
927.25 MHz

801.68 mW

MA SB

SC FC

CORR



CENTER 927.25 MHz

SPAN 20.00 MHz

#RES BW 1.0 MHz

#VBW 3 MHz

#SWP 200 msec

11 Antenna Gain

FCC15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

11.1 Test Results:

The 900MHz Spread Spectrum Data Transceiver Module, MR-900 to comply with the requirements. It is suggesting to extending 2 dBi Whip Antenna or 2dBi YAGI Antenna.

Channel Frequency(MHz)	Peak Power(dBm)	Limit(dBm)	Available exceeding gain(dB)	Pass/Fail
902.75	28.25	≤ 30	1.75 dB	Pass
914.75	28.68	≤ 30	1.32 dB	Pass
927.25	29.04	≤ 30	0.96 dB	Pass

- 2dBi Whip Antenna



- 2dBi YAGI Antenna(Including Cable, 6dB Cable loss)



12 RF Exposure (SAR)

FCC15.247(b)

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

According to Section 1.1307b(1), the EUT does not require an environmental evaluation.

1. This equipment classification is not listed within Table 1 of Section 1.1307 and is not listed in Section 1.1307b(2).
2. The DUT is categorically exempt from routine environmental evaluation per Section 2.1093.

Included are calculations that determine that minimum distance from the transmitter antenna that will ensure an exposure limit at or below the guidelines given in Table 1 of Section 1.1310 for the general population. The formula for these calculations are taken from OET Bulletin 65, edition 97-01, August 1997; "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields".

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

12.1 Calculations

Per Table 1 of Section 1.1310, the limit for General Population/Uncontrolled Exposure at 902 to 928MHz is 3.007 to 3.093 mW/cm²(f/300 mw/cm²).

Per OET Bulletin 65, Edition 97-01, the formula for calculating power density is: $S=P*G/4\pi R^2$ with:

Channel Frequency(MHz)	Peak Power(mW)	Gain of Antenna	Max. safety distance(cm)
902.75	668.34	1.585	5.29
914.75	737.90	1.585	5.52
927.25	801.68	1.585	5.72

12.2 Conclusion

The manufacturer has to specify 6 cm as the minimum safe distance in the EUT's User Manual.

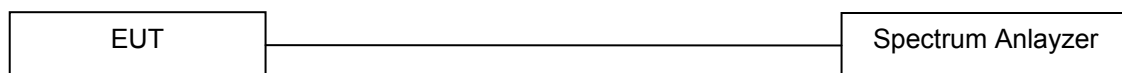
13 Conducted Spurious Emissions

FCC15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

13.1 Test Procedures

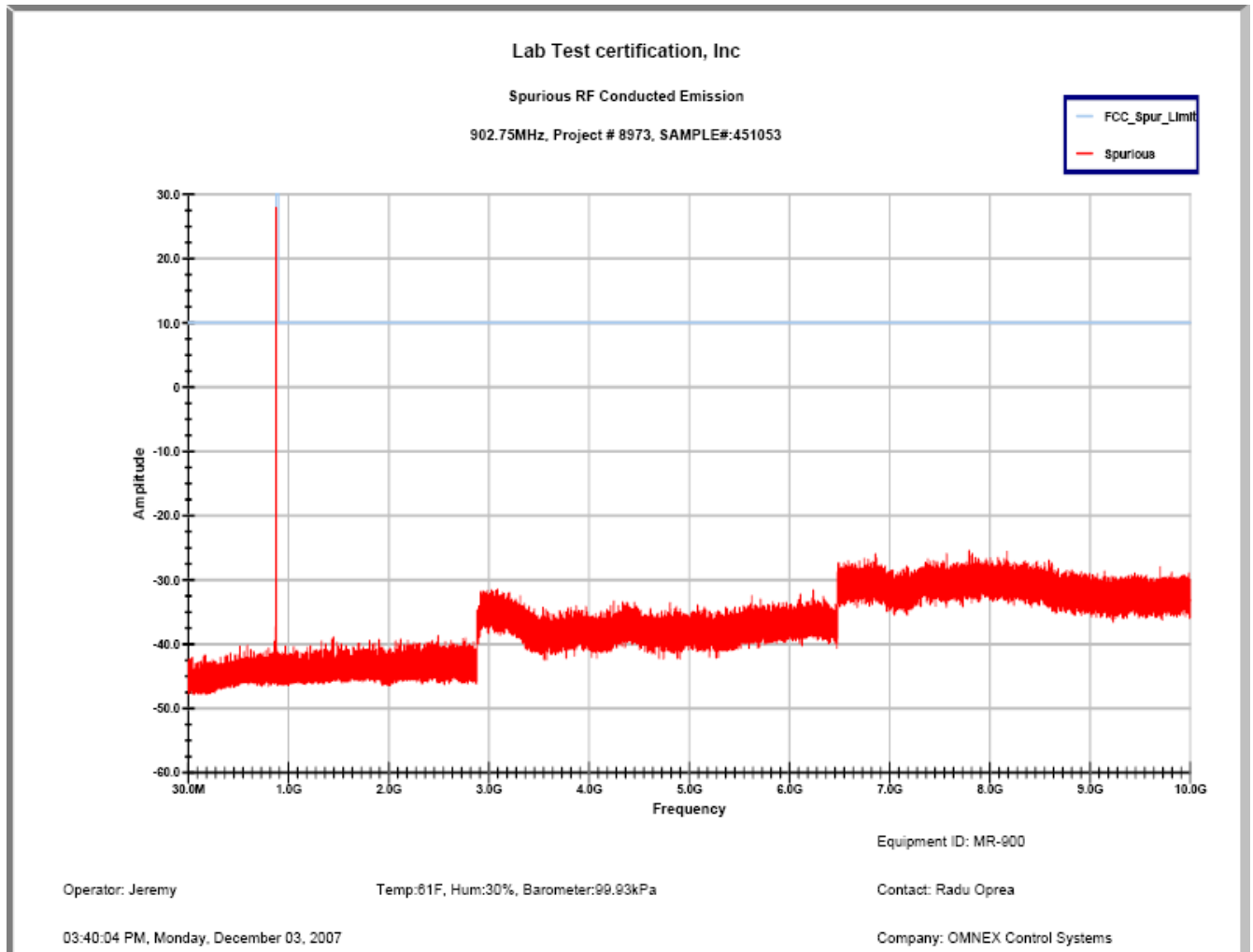
- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter shall be transmitting at its maximum data rate.
- The following measurements were made with
 - Span = wide enough to capture the peak level of the in-band emission and all spuriousth emissions (e.g., harmonics) from the lowest frequency generated in the DUT up through the 10th harmonic.
 - RBW = 100kHz
 - VBW ≥ RBW
 - Sweep = Auto
 - Detector Function = peak
 - Trace = Max Hold
- The level displayed must comply with the limit specified in this section.
- Submit this plot



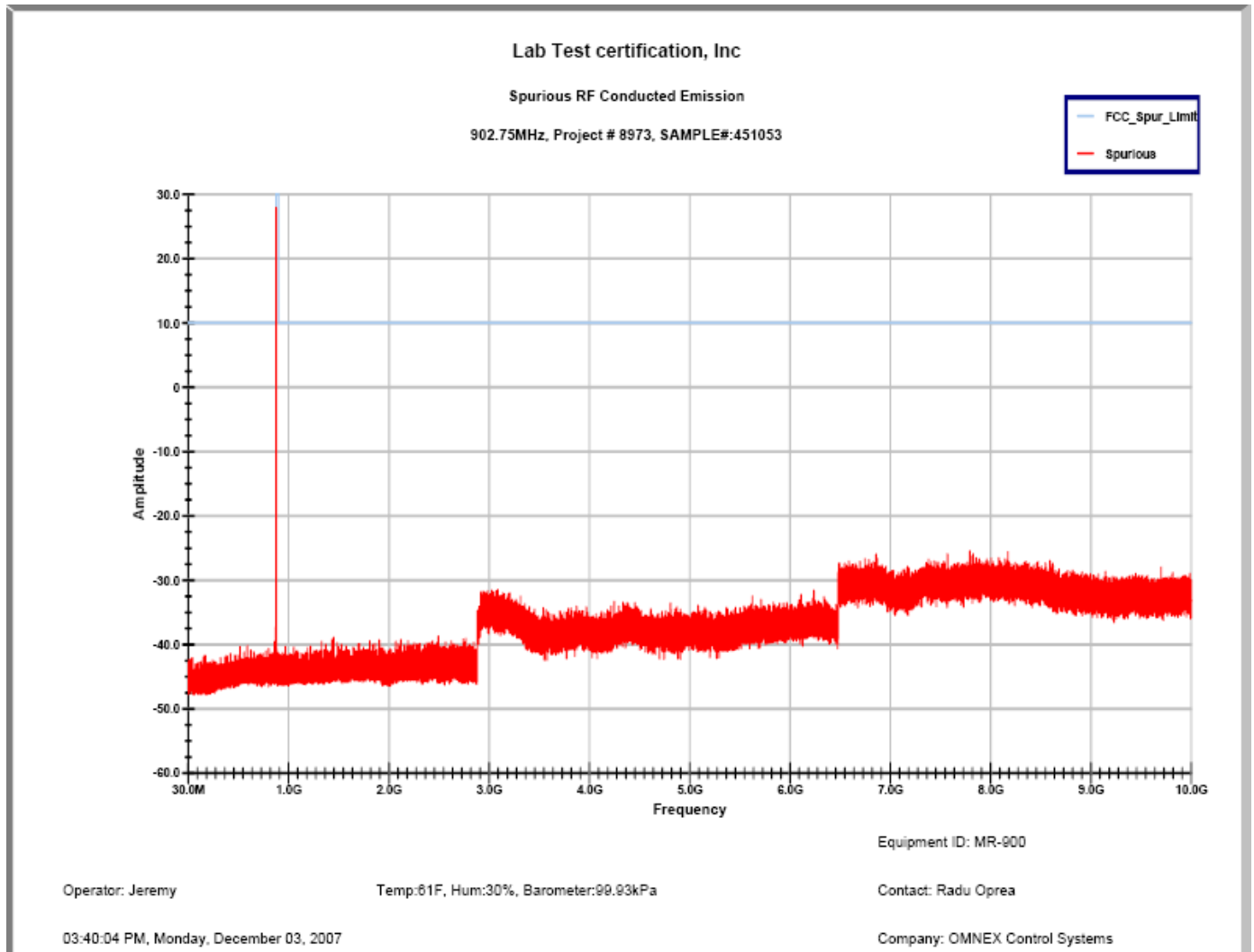
13.2 Test Results:

All conducted spurious emission is under limit (20dB below of Carrier).

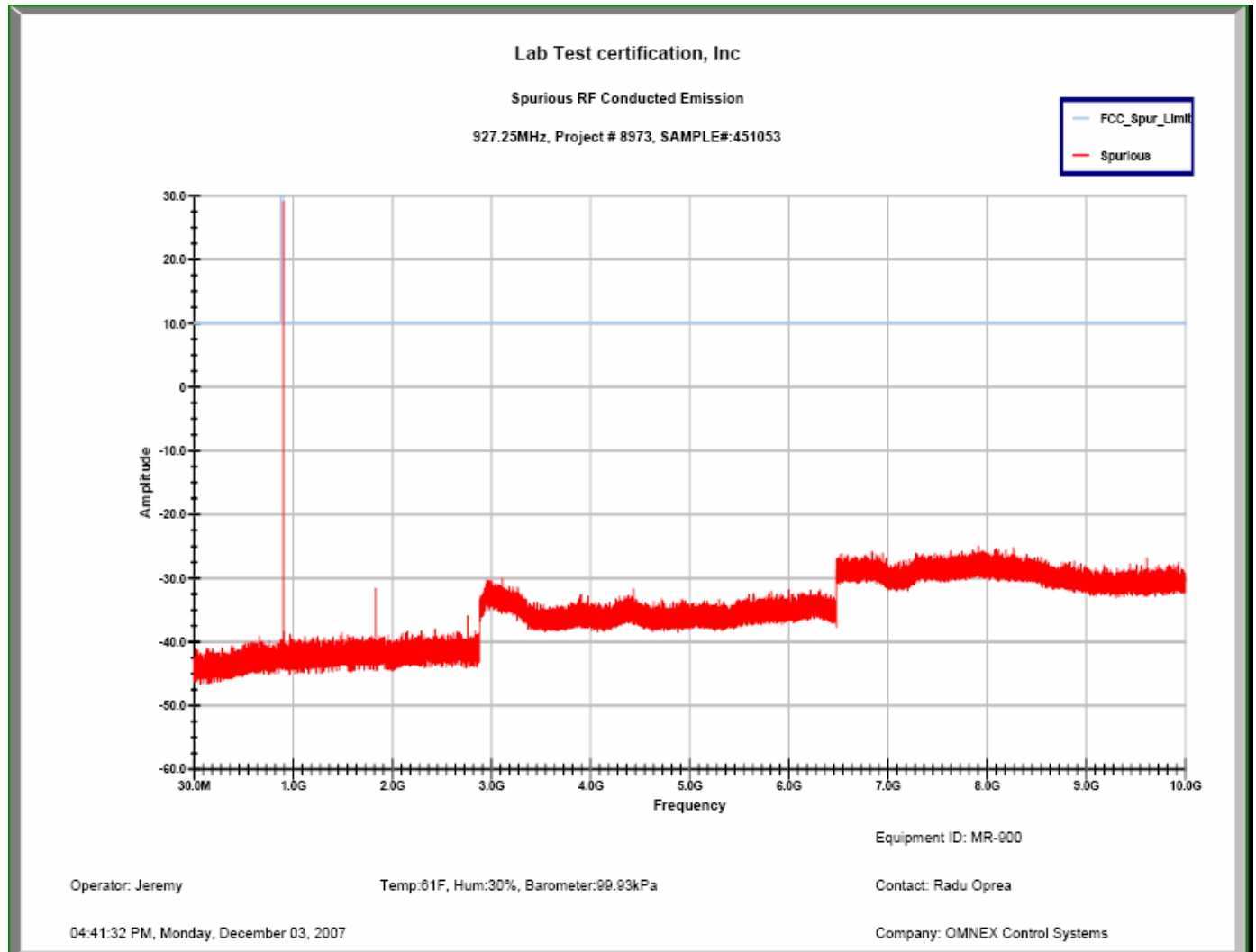
- EUT Operating Frequency for Test is: 902.75MHz



- EUT Operating Frequency for Test is: 914.75MHz



- EUT Operating Frequency for Test is: 927.25MHz



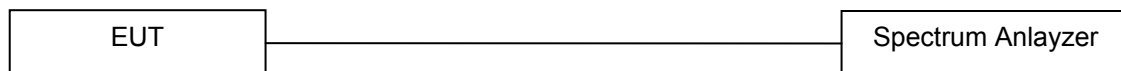
14 Out of Band Emissions

FCC15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

14.1 Test Procedures

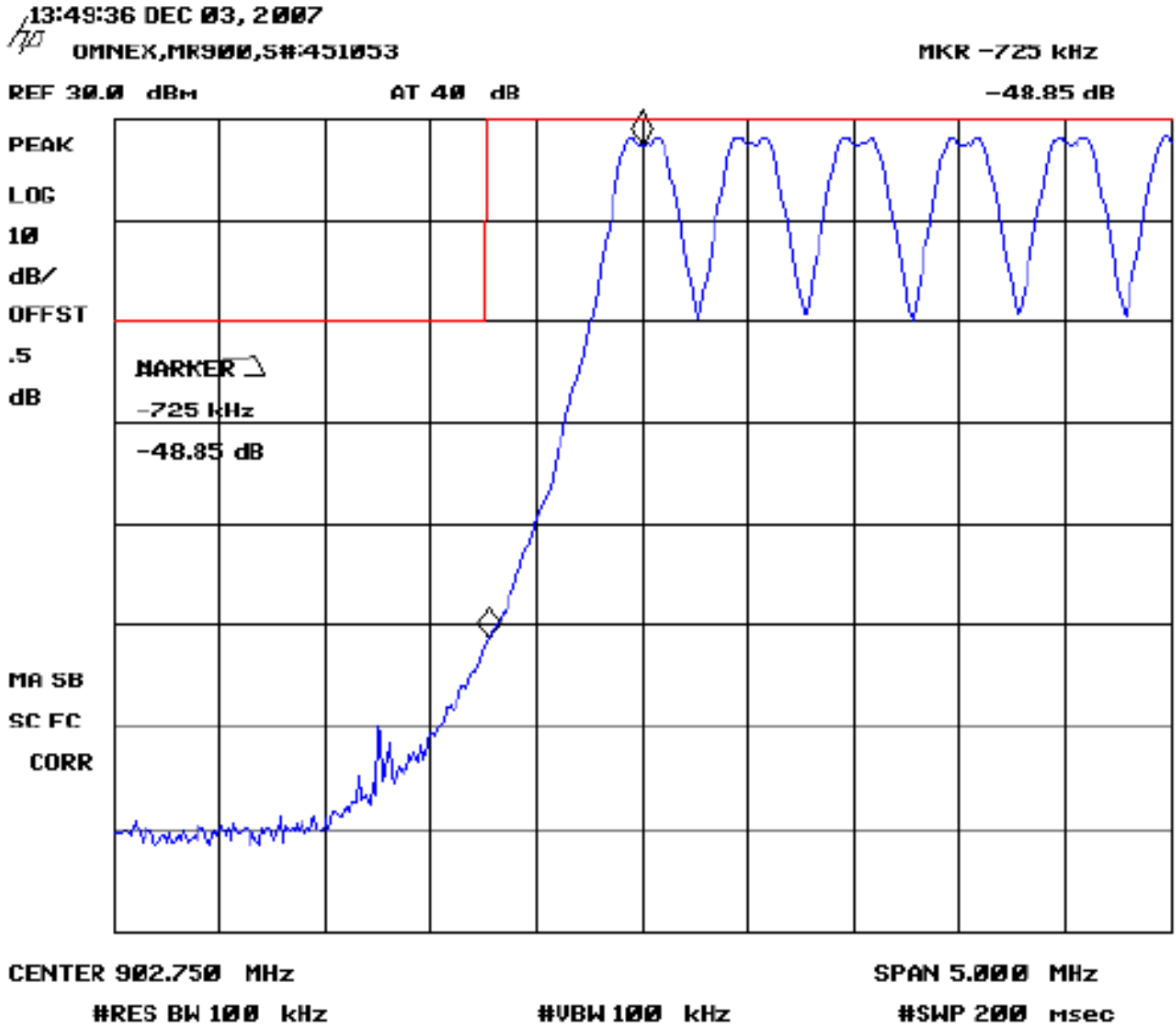
- The RF output of the EUT was connected to the RF input port of the Spectrum Analyzer.
- The EUT had its hopping function enabled.
- The transmitter shall be transmitting at its maximum data rate.
- The following measurements were made with
 - Span = wide enough to capture the peak level of the emission operating closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
 - RBW \geq 1% of the span.
 - VBW \geq RBW
 - Sweep = Auto
 - Detector Function = peak
 - Trace = Max Hold
- The level displayed must comply with the limit specified in this section.
- Submit this plot



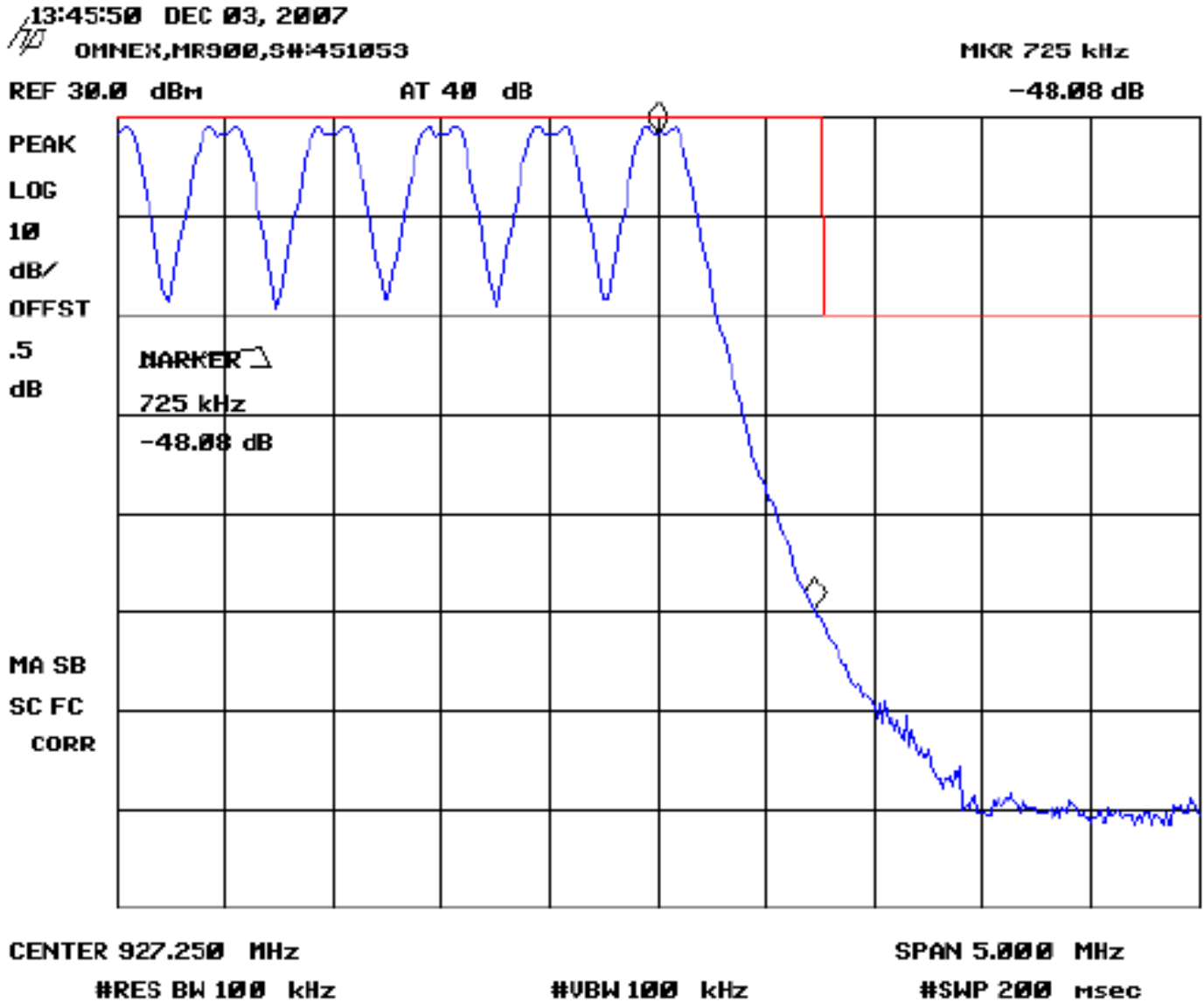
14.2 Test Results:

All out of band emission is under limit (20dB below of Carrier).

- Lower Band-edge



- Upper Band-edge



15 Radiated Spurious Emissions

FCC15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

FCC CFR 47, Part15, Subpart C, Para. 15.205(a)- Restricted bands of operation.

[69 FR 54034, Sept. 7, 2004]

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41.			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

**FCC CFR 47, Part15, Subpart C, Para. 15.209(a)
 - Field Strength Limit within Restricted Frequency Bands**

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

15.1 Test Procedures

Test procedure is based on the FCC15.31(a)(3) - Other intentional and unintentional radiators are to be measured for compliance using the following procedure excluding sections 4.1.5.2, 5.7, 9 and 14: ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" (incorporated by reference, see § 15.38). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.

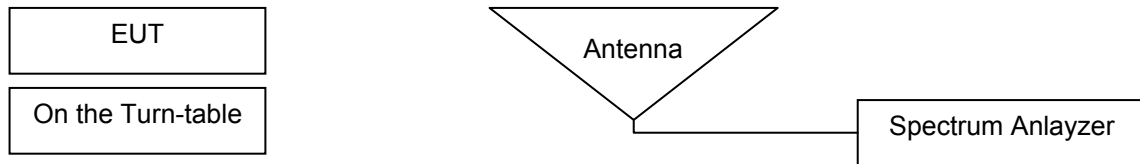
NOTE to Paragraph (a)(3): Digital devices tested to show compliance with the provisions of §§ 15.107(e) and 15.109(g) must be tested following the ANSI C63.4 procedure described in paragraph (a)(3) of this section.[As stated in the adopting R&O, ANSI C63.4 is not used for measurements below 30 MHz.]

The EUT was placed on a 1 meter by 1.5 meters wide and 0.8-meter high nonconductive table that was placed directly onto a flush mounted turntable. The EUT was connected to its support equipment with any excess I/O cabling bundled to approximately 1 meter.

Prescan tests were performed to determine the "worst-case" orientation of the EUT (By Manipulating the EUT's position through all three orthogonal axes). With the EUT positioned in the "worst case" orientation, emissions from the unit were maximized by manipulating the cables, and by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable.

Radiated Emissions Test Characteristics

Frequency range	30 MHz – 10GHz
Test distance	3 m
Test instrumentation resolution bandwidth	100kHz(below 1GHz) / 1MHz(above 1GHz)
Detecting Method	- Quasi-Peak(below 1GHz) - Average(above 1GHz)
Receive antenna scan height	1 m – 4 m
Receive antenna polarization	Vertical/Horizontal



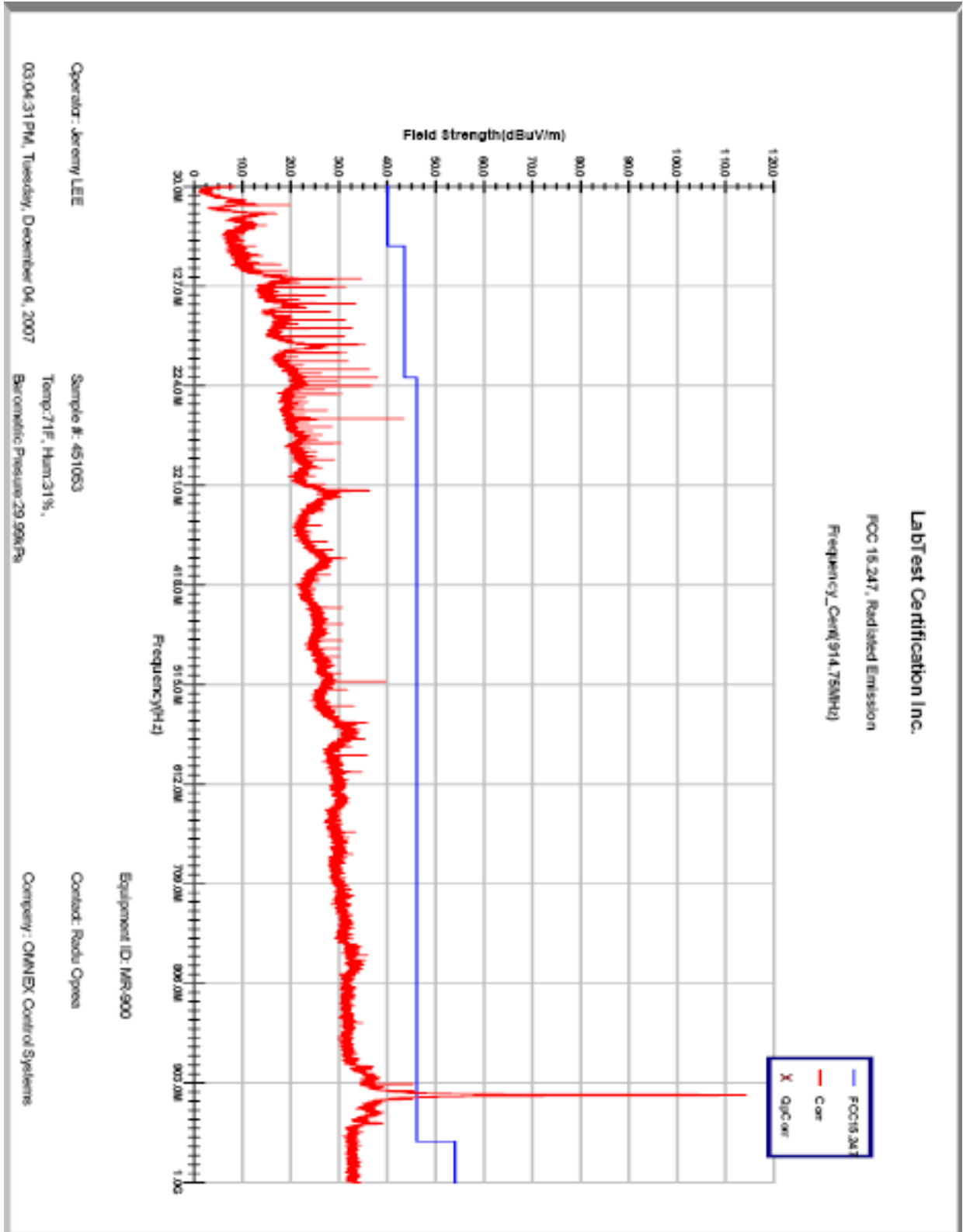
15.2 Test Results:

All radiated spurious signals were under limit of FCC15.247B.

All measured data are calculated as below formula.

$$\text{Field Strength(dBuV/m)} = \text{Spectrum Analyzer's Level(dBuV)} + \text{Antenna Factor(1/m)} + \text{Cable Loss(dB)} - \text{Pre-amplifier Gain(dB)}$$

- Pre-scan at GTEM



- OATS Test results, Frequency are hopping with Whip Antenna, the unit of data is dBuV/m.

Operator: Jeremy Lee
 03:29:23 PM, Wednesday, December 05, 2007

LabTest Certification Inc.
 PC15.247, Radiated Spurious Emissions
 Frequency Hopping, Scan:100 to 1000MHz

Equipment ID: M9000

Frequency MHz	PC15_3M	Qual_Peak	Turn_Table	Tower	Pol
30.000 MHz	40.00				
88.000 MHz	40.00				
88.000 MHz	43.52				
216.000 MHz	43.52				
216.000 MHz	46.02				
307.766 MHz	46.02	18.66	69.40	2.10	H
217.214 MHz	46.02	18.91	14.90	2.05	H
512.044 MHz	46.02	37.92	321.10	2.01	H
768.037 MHz	46.02	29.64	333.90	1.95	H
901.503 MHz	46.02	29.96	275.40	1.87	H
960.000 MHz	46.02				
960.000 MHz	53.98				
40.000 GHz	53.98				
Temp: 8.5 C, Humidity: 300H					
Barometer Pressure: 30.17kPa					

16 Continuous Data and Short Transmission

FCC15.247(g)

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

16.1 Test Results

When required to send continuous data, all frequencies of a sequence were used once before any re-use of frequencies occurred. When presented with a short burst, any one frequency is not reused until all frequencies of the sequence have been used. In no case is a sequence truncated and restarted.

17 Coordination of Frequency Hopping

FCC15.247(h)

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

17.1 Test Results

This system did not incorporate intelligence to avoid interfering carriers. It progressed linearly through the hopping sequence.

18 AC Power Line Conducted Emission

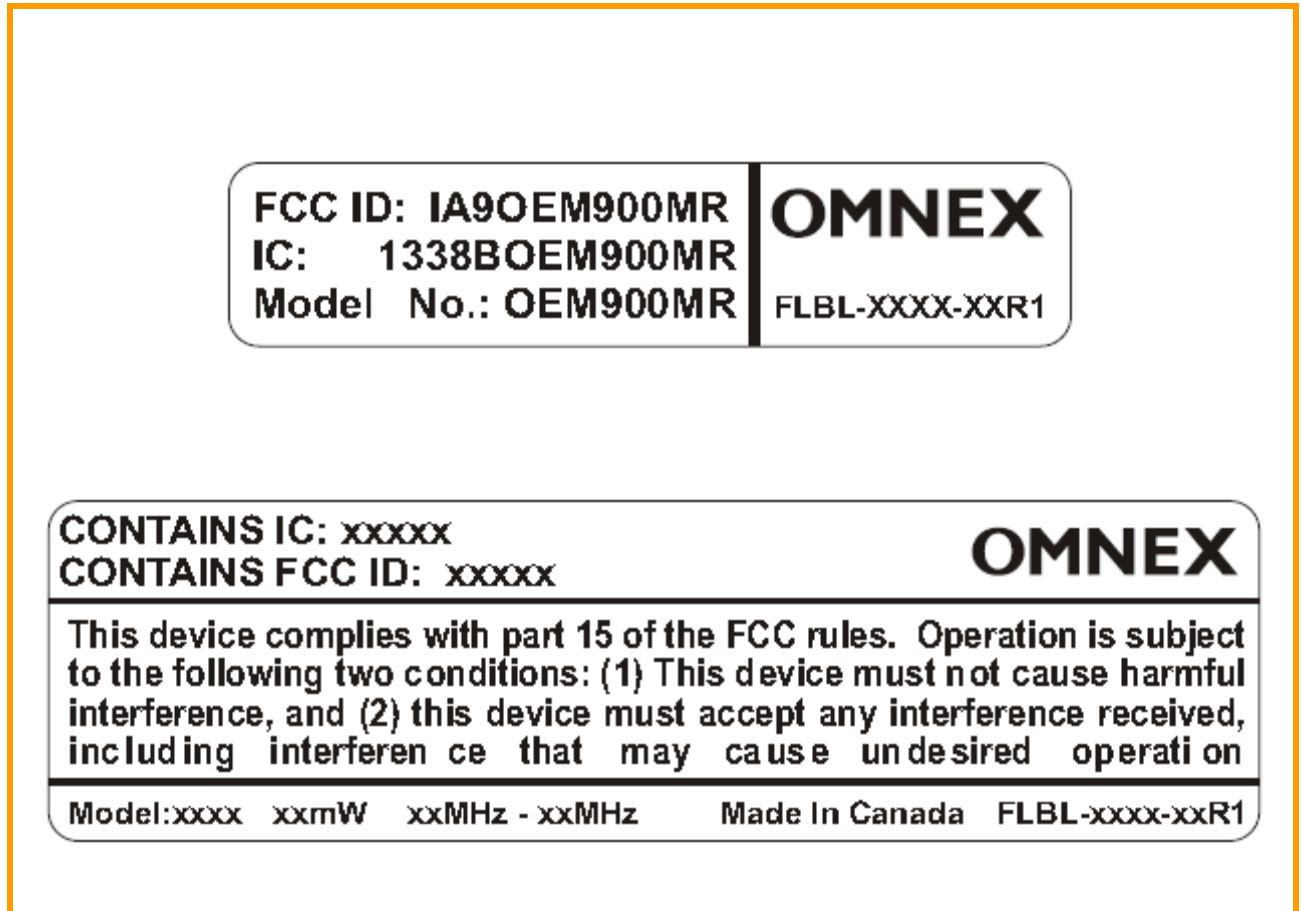
FCC15.207 (a)

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

18.1 Test Results

This test is not applicable because this EUT will be supplied by DC power, +22V to +30V, from the main module.

19 Markings



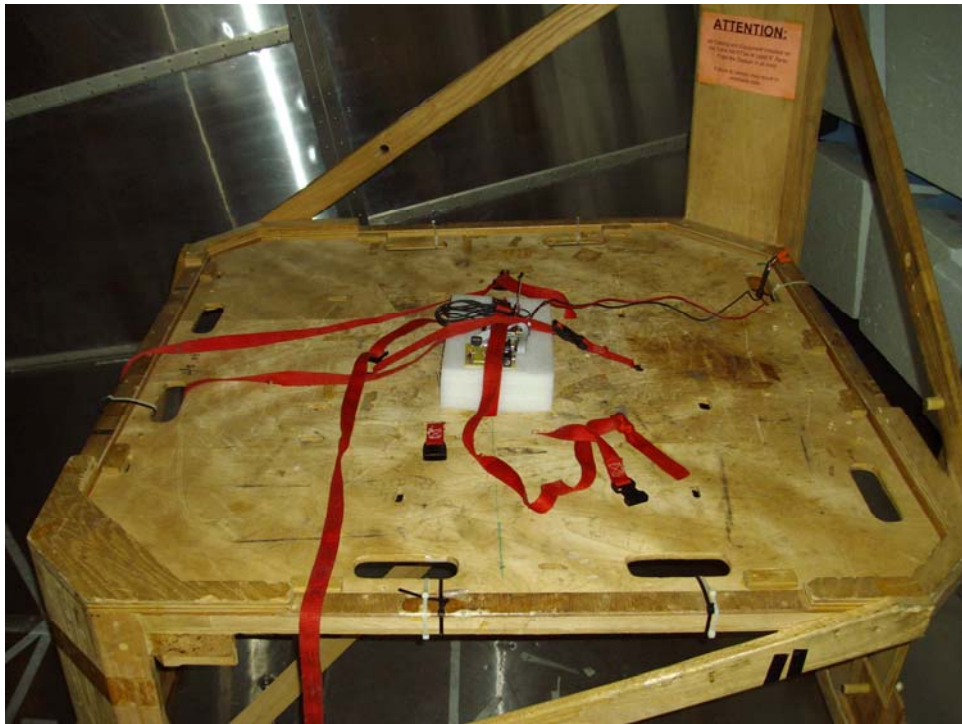
20 Test Equipment Used

Item	Type	Equipment No	Calibration date		Comment
			Last	Due	
HP8593EM	Spectrum Analyzer	3536A00113	Sep. 15,2007	Sep. 13,2008	
PA-103	Pre-amplifier	269525	Nov.29, 2007	Nov.29, 2008	
EMCO5317	GTEM		Oct. 04, 2005	Oct. 04, 2010	
EMCO3110B	Antenna (30-300MHz)	9211-1595	Mar. 09,2007	Mar. 09,2008	
SAS-501-2	Antenna (0.3-1GHz)		Mar. 30,2007	Mar. 30,2008	
SAS-571	Antenna (1-18GHz)		Mar. 30,2007	Mar. 30,2008	
XP605	DC Power Supply	20030712152	N/A	N/A	

21 FIGURES AND SCHEMATICS

22 Photographs







END OF REPORT