Washington Laboratories, Ltd.

FCC Certification Test Report
for the
IBA Molecular, N.A.
Synthera

URQ-FDG000001

WLL JOB# **9451**
November 2006

Prepared for:

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Abstract

This report has been prepared on behalf of IBA Molecular, N.A. to support the attached Application for Equipment Authorization. The test report and application are submitted for an Intentional Radiator under Part 15.209 of the FCC Rules. This Certification Test Report documents the test configuration and test results for an IBA Molecular, N.A. Synthera.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The IBA Molecular, N.A. Synthera complies with the limits for an Intentional Radiator device under FCC Part 15.209.

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Compliance Statement

The IBA Molecular, N.A. Synthera complies with the limits for an Intentional Radiator device under FCC Part 15.209.

1.2 Test Scope

Tests for radiated emissions were performed. All measurements were performed in accordance with 2003 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer:	IBA Molecular, N.A. 100 Executive Drive, Suite 100 Sterling, VA 20166
Purchase Order Number:	MK06276
Quotation Number:	63183-A

1.4 Test Dates

Testing was performed on the following date(s):	October 23 to October 25, 2006

1.5 Test and Support Personnel

Washington Laboratories, LTD	John Rapella, Adam Black
Client Representative	Chuck Mulchi

2 Equipment Under Test

2.1 EUT Identification & Description

The IBA Molecular, N.A. Synthera Synthesis Unit is a multi-purpose synthesis system which automates the synthesis of radiopharmaceuticals. The unit performs reagent additions, solution mixing, and heating operations. The system consists of the Control unit which operates on 115/230VAC and the Synthesis unit which operates on 24VDC provided from an external 115/230VAC power supply.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	IBA Molecular, N.A.
FCC ID:	URQ-FDG000001
Model:	Synthera
FCC Rule Parts:	§15.209
Frequency Range:	134.25kHz
Maximum Field Strength:	2,850.2µV/m (at 10m)
Occupied Bandwidth:	1.08kHz
Keying:	Automatic
Type of Information:	Data
Number of Channels:	1
Power Output Level	Fixed
Antenna Connector	Integral Antenna
Interface Cables:	USB for data retrieval and programming
Power Source & Voltage:	24Vdc from 115Vac power source

2.2 Test Configuration

The Synthera was configured a support laptop computer, the Control Box, the Synthesis unit, and a power supply.

2.3 Testing Algorithm

The Synthera was placed into a continuous transmit mode for testing purposes. The unit was tested in three different orthogonal planes.

Worst case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

2.5 Measurements

2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 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

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

Table 2. Test Equipment List

WLL Asset #	Manufacturer Model/Type	Function	Cal. Due
00070	HP, 85685A	PRESELECTOR, RF W/OPT 8ZE	7/3/2007
00361	GLOBAL SPECIALTIES, 1337	SUPPLY, POWER, DC	CNR
00124	SOLAR 8028-50-TS-BNC	LISN	1/31/2007
00125	SOLAR 8028-50-TS-BNC	LISN	1/31/2007
00030	EMCO, 3301B	ANTENNA, ACTIVE ROD	4/4/2007

4 Test Results

4.1 Occupied Bandwidth: (FCC Part §2.1049)

Occupied bandwidth was performed by placing the receive loop antenna near the antenna of the EUT. The 20dB bandwidth was then determined form the received signal displayed on the spectrum analyzer. At full modulation, the occupied bandwidth was measured as shown in Figure 1. Table 3 lists the measured 20dB bandwidth.

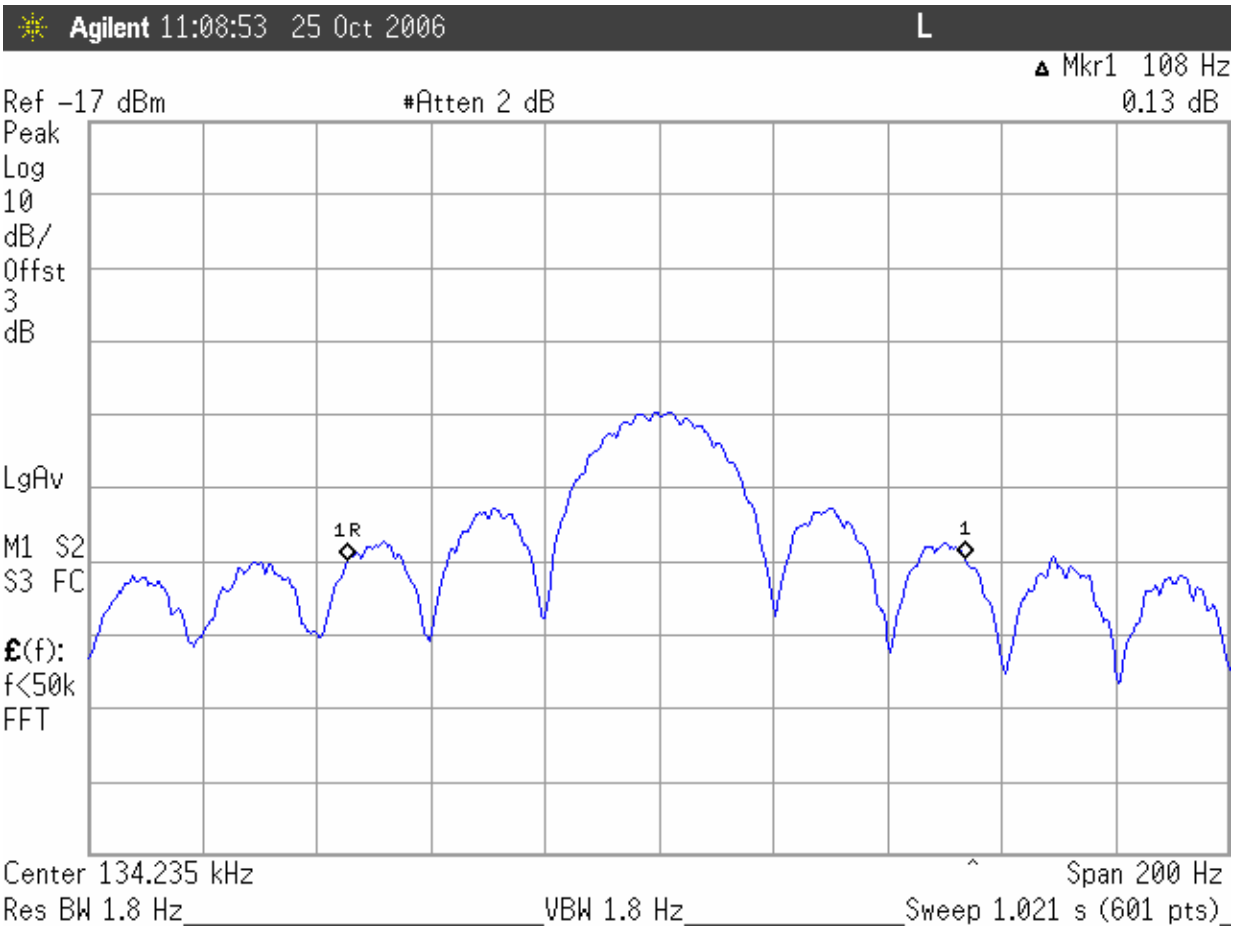

Figure 1. Occupied Bandwidth

Table 3 provides a summary of the Occupied Bandwidth Results.

Table 3. Occupied Bandwidth Results

Frequency	Bandwidth
134.25kHz	1.08kHz

4.2 AC Line Conducted Emissions (FCC Part 15.207)

4.2.1 Requirements

The following are the limits as specified in FCC §15.207.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

4.2.2 Test Procedure

The EUT was placed on an 80 cm high 1 X 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω/50 μH Line Impedance Stabilization Network bonded to a 3 X 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak, peak, or average as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed.

4.2.3 Test Data

Table 4 provides the test results for phase and neutral line power line conducted emissions testing of the Processor Unit.

Table 4. AC Line Conducted Emissions Test Data

LINE 1 - NEUTRAL

Frequency (MHz)	Level QP (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBµV)	Level Corr (dBµV)	Margin QP (dB)	Level AVG (dBµV)	Cable Loss (dB)	Level Corr (dBµV)	Limit AVG (dBµV)	Margin AVG (dB)
0.195	44.7	10.1	0.6	63.8	55.4	-8.4	26.2	10.1	36.9	53.8	-16.9
8.000	26.6	11.3	1.0	60.0	38.9	-21.1	24.6	11.3	36.9	50.0	-13.1
11.030	24.0	11.7	1.4	60.0	37.1	-22.9	18.9	11.7	32.0	50.0	-18.0
16.001	24.6	12.1	2.5	60.0	39.2	-20.8	23.4	12.1	38.0	50.0	-12.0
20.000	23.5	12.4	3.1	60.0	38.9	-21.1	22.5	12.4	38.0	50.0	-12.0
24.100	26.8	12.6	4.1	60.0	43.5	-16.5	22.7	12.6	39.4	50.0	-10.6
28.001	23.8	12.7	4.9	60.0	41.4	-18.6	22.3	12.7	40.0	50.0	-10.0

LINE 2 - PHASE

Frequency (MHz)	Level QP (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Limit QP (dBµV)	Level Corr (dBµV)	Margin QP (dB)	Level AVG (dBµV)	Cable Loss (dB)	Level Corr (dBµV)	Limit AVG (dBµV)	Margin AVG (dB)
0.231	35.2	10.2	0.2	62.4	45.6	-16.8	35.2	10.2	45.6	52.4	-6.8
0.429	34.6	10.3	0.2	57.3	45.1	-12.2	34.6	10.3	45.1	47.3	-2.2
2.740	31.2	10.5	0.7	56.0	42.4	-13.6	31.2	10.5	42.4	46.0	-3.6
8.000	28.9	11.3	1.4	60.0	41.6	-18.4	28.9	11.3	41.6	50.0	-8.4
16.000	24.3	12.1	3.3	60.0	39.7	-20.3	24.3	12.1	39.7	50.0	-10.3
20.000	24.0	12.4	4.1	60.0	40.5	-19.5	24.0	12.4	40.5	50.0	-9.5
24.000	24.7	12.6	5.1	60.0	42.3	-17.7	24.7	12.6	42.3	50.0	-7.7

4.3 Radiated Spurious Emissions: (FCC Part §2.1053)

The EUT must comply with the requirements for radiated emissions per the limits specified in §15.209.

The following tables list the emission limits:

Table 5. General Field Strength for Transmitters at Frequencies Above 30MHz

Frequency (MHz)	Field Strength µV/m at 3m (Watts, E.I.R.P.)
	Transmitters
30-88	100 (3 nW)
88-216	150 (6.8 nW)
216-960	200 (12 nW)
Above 960	500 (75 nW)

Table 6. General Field Strength for Transmitters at Frequencies Below 30MHz

Frequency (fundamental or spurious)	Field Strength µV/m	Magnetic H-Field µA/m	Measurement Distance
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in Hz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

4.3.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 10-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. For frequencies below 30MHz the receiving loop antenna was rotated about its vertical axis to determine the maximum emissions. For emissions testing above 30MHz receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

Measurements performed below 30MHz were made at a test distance closer than specified. The measurement at the fundamental was made at 10m while the harmonics and spurious up to 30MHz were also made at 10m.

The emissions were measured using the following resolution bandwidths:

Frequency Range	Resolution Bandwidth	Video Bandwidth
125k – 30MHz	9kHz	>10 kHz
30M – 1000MHz	120kHz	>100 kHz

The limits in the following table for the emissions below 30MHz were adjusted to the appropriate distance using the inverse distance square formula of 40dB per decade of measurement distance. The limit at 300 meters works out to be 17.87 µV/m, which works out to be 178,704 µV/m at 10 meters. Measurements taken at an antenna height of one (1) meter.

Table 7. Radiated Emission Test Data, Fundamental Frequency Data

Frequency (MHz)	Polarity H/V	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)	Comments
0.13430	X	58.1	10.8	0.2	69.1	2850.2	178704.4	-35.9	
0.13460	X	40.5	10.8	0.2	51.5	375.7	178306.1	-53.5	
0.13501	X	34.4	10.8	0.2	45.4	186.1	177769.9	-59.6	
0.13630	H	24.1	10.8	0.2	35.1	56.8	176082.2	-69.8	AMB
2.99700	X	24.4	10.2	0.7	35.3	58.0	3000.0	-34.3	AMB
18.98000	X	28.0	10.6	1.3	39.9	99.2	3000.0	-29.6	AMB
27.03500	X	12.6	9.2	1.5	23.4	14.8	3000.0	-46.1	AMB
0.13430	Y	49.9	10.8	0.2	60.9	1108.8	178704.4	-44.1	
0.13460	Y	37.0	10.8	0.2	48.0	251.1	178306.1	-57.0	
0.13501	Y	28.9	10.8	0.2	39.9	98.8	177769.9	-65.1	
0.13630	Y	27.6	10.8	0.2	38.6	85.1	176082.2	-66.3	
2.99700	Y	20.9	10.2	0.7	31.8	38.8	3000.0	-37.8	
18.98000	Y	24.4	10.6	1.3	36.3	65.2	3000.0	-33.3	
27.03500	Y	10.6	9.2	1.5	21.3	11.7	3000.0	-48.2	

<30MHz normalized to 3m (40dB/decade)

Position: X = →

Y = ↑

Z = ●

Table 8. Radiated Emission Test Data, Low Frequency Data (<1GHz)

Frequency (MHz)	Polarity H/V	Az Deg	Ant. Hght (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
48.03	H	297.0	1.9	3.3	8.5	1.9	13.7	4.8	90.0	-25.4
52.04	H	200.0	1.0	5.7	7.3	1.9	15.0	5.6	90.0	-24.1
56.03	H	357.0	1.5	5.3	7.1	2.0	14.4	5.2	90.0	-24.7
64.03	H	303.0	2.3	5.9	7.7	2.2	15.8	6.2	90.0	-23.3
135.43	H	80.0	2.5	6.5	13.6	3.2	23.3	14.6	150.0	-20.2
141.03	H	80.0	2.5	6.1	13.0	3.3	22.4	13.2	150.0	-21.1
181.20	H	90.0	2.5	8.6	11.2	3.7	23.5	15.0	150.0	-20.0
200.26	H	191.0	2.5	5.8	12.4	3.9	22.2	12.8	150.0	-21.4
314.70	H	345.0	3.8	3.8	13.9	5.1	22.8	13.9	210.0	-23.6
	V									
48.03	V	263.0	1.3	18.6	8.5	1.9	29.0	28.2	90.0	-10.1
51.02	V	205.0	1.3	10.8	7.5	1.9	20.2	10.2	90.0	-18.9
52.04	V	11.0	1.3	16.6	7.3	1.9	25.9	19.7	90.0	-13.2
56.03	V	9.0	1.3	14.6	7.1	2.0	23.7	15.3	90.0	-15.4
64.03	V	238.0	1.3	11.8	7.7	2.2	21.7	12.2	90.0	-17.4
72.03	V	128.0	1.3	8.0	8.0	2.3	18.3	8.2	90.0	-20.8
80.02	V	87.0	1.3	9.2	7.7	2.4	19.3	9.3	90.0	-19.7
135.43	V	112.0	1.9	8.4	13.6	3.2	25.2	18.2	150.0	-18.3
141.03	V	34.0	1.9	8.6	13.0	3.3	24.9	17.6	150.0	-18.6
181.20	V	92.0	2.0	3.8	11.2	3.7	18.7	8.6	150.0	-24.8
200.26	V	108.0	2.8	8.4	12.4	3.9	24.8	17.3	150.0	-18.8
314.70	V	336.0	2.0	6.6	13.9	5.1	25.6	19.1	210.0	-20.8

