



FCC & Industry Canada Certification Test Report
For the
Axiometric, LLC
Gateway II
Transceiver Unit

FCC ID: VE4-GW2C-AC
IC ID: TBD

WLL JOB# 9684
September 18, 2007

Prepared for:

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Prepared By:

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Prepared by: James Ritter
Compliance Engineer

Reviewed by: Michael Violette
President

Abstract

This report has been prepared on behalf of Axiometric, LLC to support the attached Application for Equipment Authorization. The test report and application are submitted for a Frequency Hopping Spread Spectrum Transmitter under Part 15.247 of the FCC Rules and Regulations and Spectrum Management and Telecommunications Policy RSS-210 of Industry Canada. This Certification Test Report documents the test configuration and test results for the Axiometric, LLC Gateway II Transceiver Unit.

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. The Industry Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. 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 Axiometric, LLC Gateway II Transceiver Unit complies with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247 and Industry Canada RSS-210.

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1 Introduction

1.1 Compliance Statement

The Axiometric, LLC Gateway II Transceiver Unit complies with the limits for a Frequency Hopping Spread Spectrum Transmitter device under FCC Part 15.247 and Industry Canada RSS-210.

A separate FCC declaration of Conformity Test contains data for the EUT's receiver spurious radiated emissions.

1.2 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with FCC Public Notice DA 00-705 and the 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: Axiometric, LLC
10718 Vista Road
Columbia, MD, 21044

Quotation Number: 63179

1.4 Test Dates

Testing was performed on the following date(s): 6/11-18/2007

1.5 Test and Support Personnel

Washington Laboratories, LTD James Ritter
Client Representative Frank Moody

1.6 Abbreviations

A	A mpere
ac	a lternating current
AM	A mplitude Modulation
Amps	A mperes
b/s	b its per second
BW	B and W idth
CE	C onducted E mission
cm	C entimeter
CW	C ontinuous W ave
dB	d ecibel
dc	d irect current
EMI	E lectromagnetic I nterference
EUT	E quipment U nder T est
FM	F requency M odulation
G	g iga - prefix for 10^9 multiplier
Hz	H ertz
IF	I ntermediate F requency
k	k ilo - prefix for 10^3 multiplier
LISN	L ine I mpedance S tabilization N etwork
M	M ega - prefix for 10^6 multiplier
M	M eter
μ	m icro - prefix for 10^{-6} multiplier
NB	N arrow b and
QP	Q uasi- P eak
RE	R adiated E missions
RF	R adio F requency
rms	r oot- m ean- s quare
SN	S erial N umber
S/A	S pectrum A nalyzer
V	V olt

2 Equipment Under Test

2.1 EUT Identification & Description

The Axiometric, LLC Gateway II Transceiver Unit acts as the central controller of the Axiometric, LLC mesh wireless network. It sends synchronization and configuration information to the mesh nodes, and collects information from the nodes. The Gateway II communicates to the mesh nodes via a frequency hopping spread spectrum RF link in the 902 MHz to 928 MHz ISM band. There are 2 configuration options with this transceiver Unit:

Configuration 1: The Gateway II provides a backhaul RF link for the collected data by either a wireless cellular link or a wireless WiFi link. The backhaul wireless links are implemented with a commercial modem with its own FCC modular certification. When the module is installed, the radiating elements are more than 20cm apart so co-location is not an issue.

Configuration 2: The Gateway II provides a backhaul RF link for the collected data by a wired Ethernet link. In this option power to the Gateway 2 is provided over the LAN cable via a LAN power injector.

Both configuration 1 and 2 were tested for radiated and conducted emissions.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Axiometric LLC
FCC ID Number	VE4-GW2C-AC
IC ID Number	TBD
EUT Name:	Gateway II Transceiver Unit
Model:	Gateway II
FCC Rule Parts:	15.247
IC Rule Parts	RSS-210
Frequency Range:	902.5-927MHz
Maximum Output Power:	189mW (22.7dBm)
Modulation:	FHSS FSK
20dB Bandwidth:	180 kHz
Keying:	Automatic
Type of Information:	Data
Number of Channels:	50
Power Output Level	Fixed
Antenna Type	5.5 dBi Whip
Interface Cables:	None
Power Source & Voltage:	Config 1: 120 VAC or 230VAC Config 2: 7-30VDC over LAN Port

2.2 Test Configuration

The Gateway II Transceiver Unit was configured with a 5.5 dBi Whip Antenna and programmed via a test port inside the enclosure that connected to a support laptop for test programming (this port is not normally connected).

2.3 Testing Algorithm

The Gateway II Transceiver Unit was programmed via support laptop to continuously transmit on 902.5, 915 and 927MHz. The unit was also programmed to hop it its normal operating mode.

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. The Industry Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. 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

FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

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

Conducted Emissions

Asset #	Manufacturer/Model	Description	Cal. Due
00069	HP, 85650A	ADAPTER, QP	6/26/2007
00071	HP, 85685A	PRESELECTOR, RF	6/26/2007
00073	HP, 8568B	ANALYZER, SPECTRUM	6/26/2007
00053	HP, 11947A	LIMITER, TRANSIENT	4/9/2008
00125	SOLAR, 8028-50-TS-24-BNC	LISN	2/1/2008
00126	SOLAR, 8028-50-TS-24-BNC	LISN	2/1/2008

Radiated Emissions

Asset #	Manufacturer/Model	Description	Cal. Due
00618	HP 8563A	ANALYZER, SPECTRUM	2/9/2008
00066	HP, 8449B	PRE-AMPLIFIER, RF. 1-26.5GHZ	6/22/2007
00004	ARA, DRG-118/A	ANTENNA, DRG, 1-18GHZ	2/2/2009
00069	HP, 85650A	ADAPTER, QP	6/26/2007
00073	HP, 8568B	ANALYZER, SPECTRUM	6/26/2007
00071	HP, 85685A	PRESELECTOR, RF	6/26/2007
00007	ARA, LPB-2520	ANTENNA, BICONILOG ANTENNA	6/7/2008

Bench Conducted Emissions

Asset #	Manufacturer/Model	Description	Cal. Due
00074	HP, 8593A	ANALYZER, SPECTRUM	2/7/2008
00541	MEGAPHASE, LLC TM40-K1K1-36	CABLE, 36" BENCH TEST CABLE	9/11/2007
00528	AGILENT, E4446A	ANALYZER, SPECTRUM	2/15/2008

4 Test Results

4.1 Duty Cycle Correction and Time of Occupancy

In accordance with the FCC Public Notice the spurious radiated emissions measurements may be adjusted if using a duty cycle correction factor if the dwell time per channel of the hopping signal is less than 100 ms.

The duty cycle correction factor is calculated by:

$$20 \times \text{LOG} (\text{dwell time}/100 \text{ ms})$$

The following figure shows the plot of the dwell time for the transmitter. Based on this plot, the dwell time per hop is 108msec.

No Duty cycle correction is allowed

In Accordance with FCC Part 15.247 (a)(i) systems operating in the 902-928 MHz band with a bandwidth of less than 250kHz and 50 hopping channels shall transmit no more than 0.4 seconds in any 20 second period.

Figure 4-2 shows compliance with this paragraph.

Axiometric LLC, Gateway II Transceiver Unit, Part 15.247 Time of Occupancy On time for a single Hop
Frequency 902.5MHz used. On time for a single Hop= 108ms
Note (No additional Radiated duty cycle correction allowed for On times greater than 100ms)

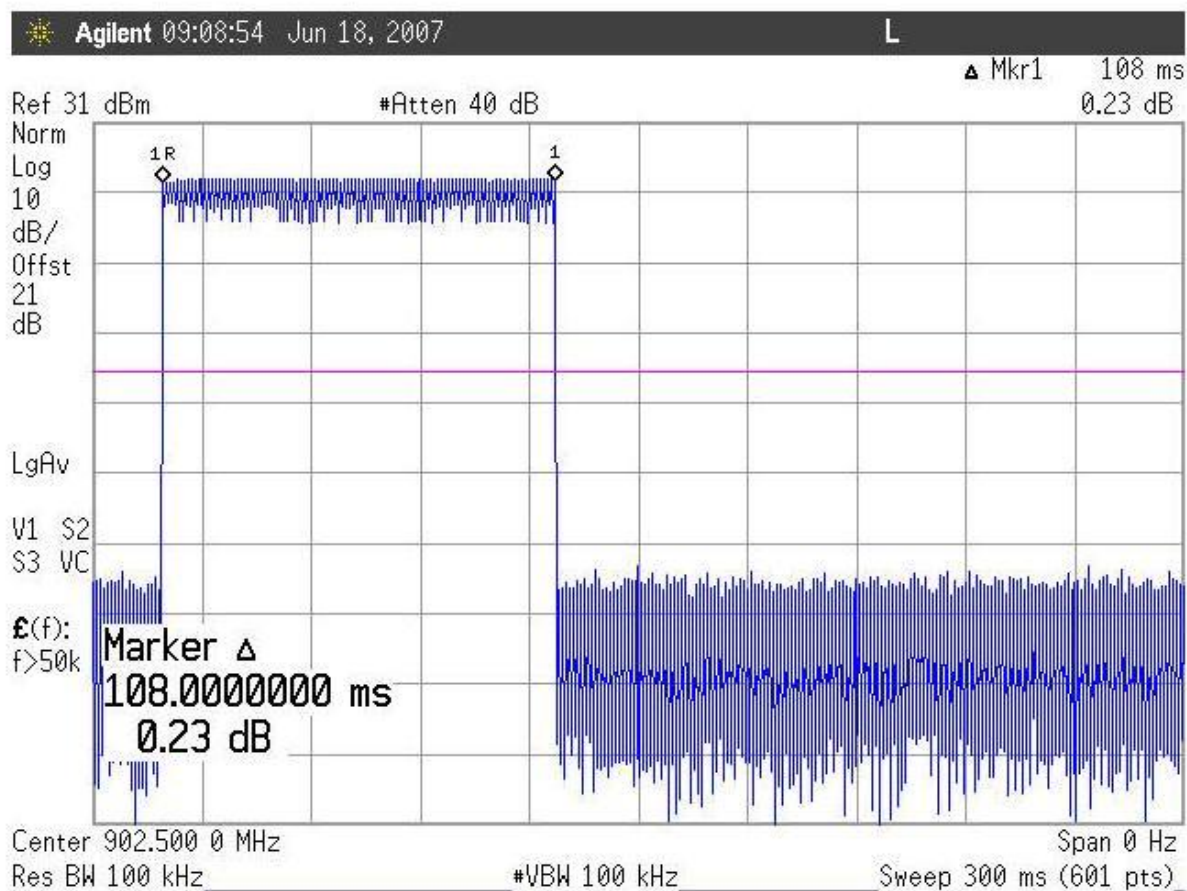


Figure 4-1. Duty Cycle Plot

Axiometric LLC, Gateway II Transceiver Unit, Pt15.247 Time Of Occupancy
One Pulse = 108mSec (sec One Pulse Plot), 1 Pulse per 20 Second Period
Limit= 0.4 Sec Maximum within 20 Second Period

Unit Complies

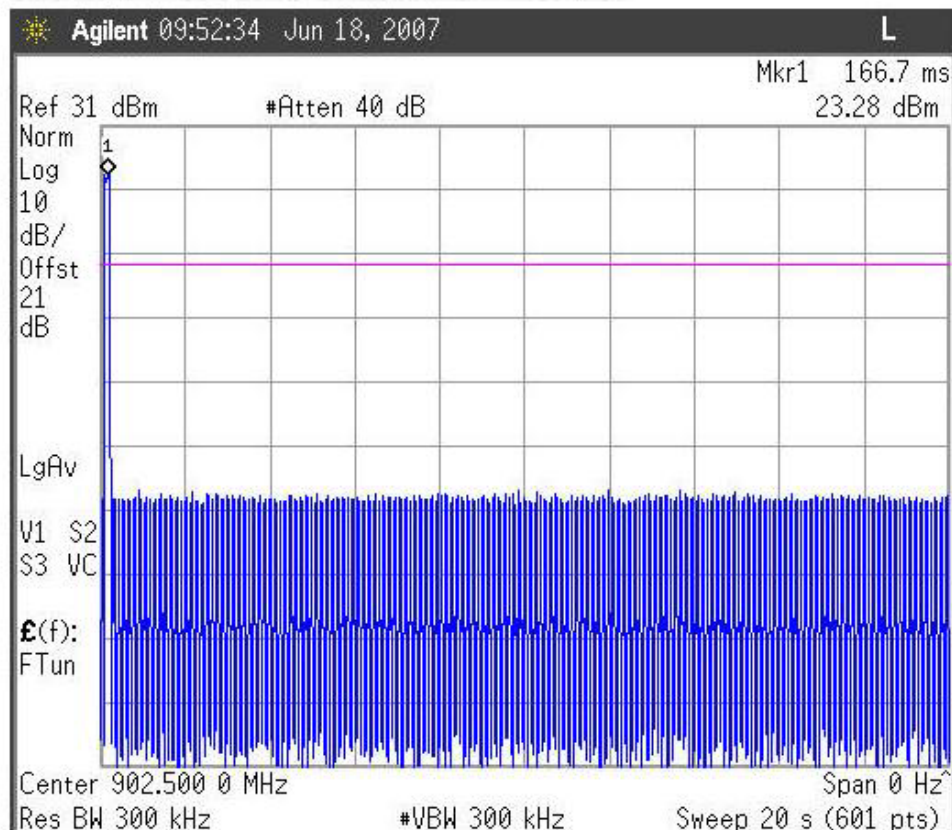


Figure 4-2 Time of Occupancy

4.2 RF Power Output: (FCC Part §2.1046)

To measure the output power the hopping sequence was stopped while the frequency dwelled on a low, high and middle channel. The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer. The analyzer offset was adjusted to compensate for the attenuator and other losses in the system.

Table 3. RF Power Output

Frequency	Level	Limit	Pass/Fail
Low Channel: 902.5MHz	22.75 dBm	30 dBm	Pass
Mid Channel: 915.0MHz	22.77 dBm	30 dBm	Pass
High Channel: 927.0MHz	22.50 dBm	30 dBm	Pass

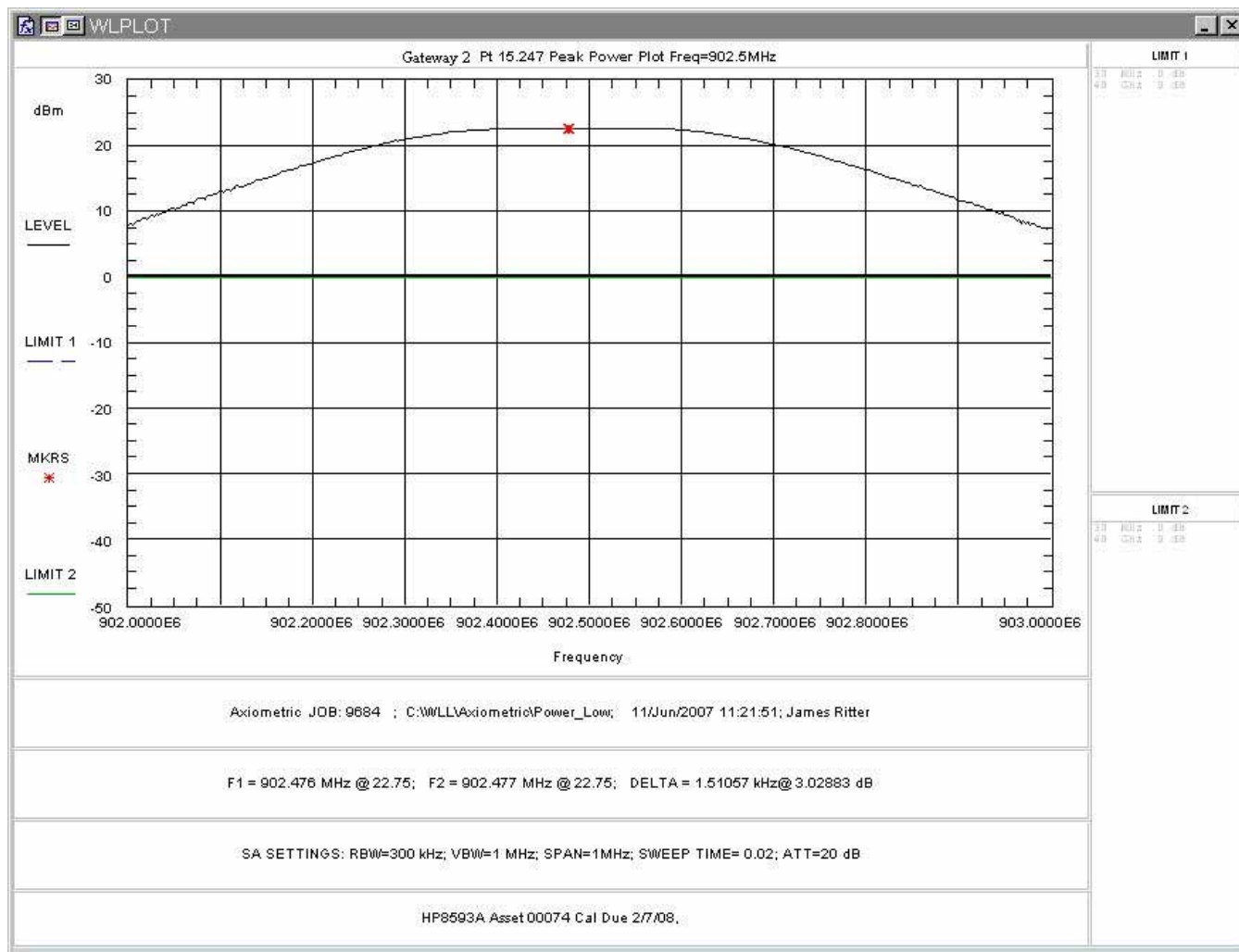


Figure 4-3. RF Peak Power, Low Channel

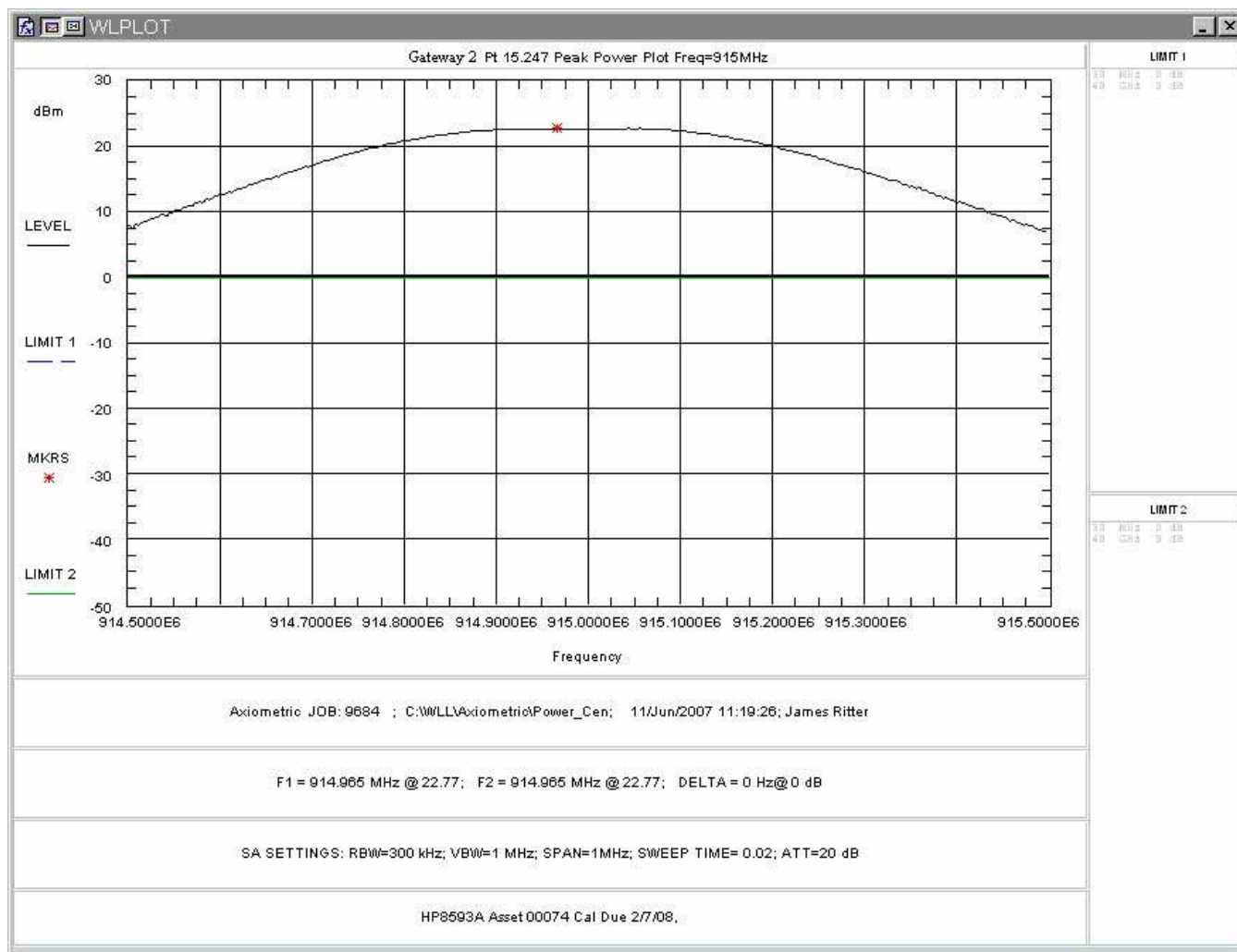


Figure 4-4. RF Peak Power, Mid Channel

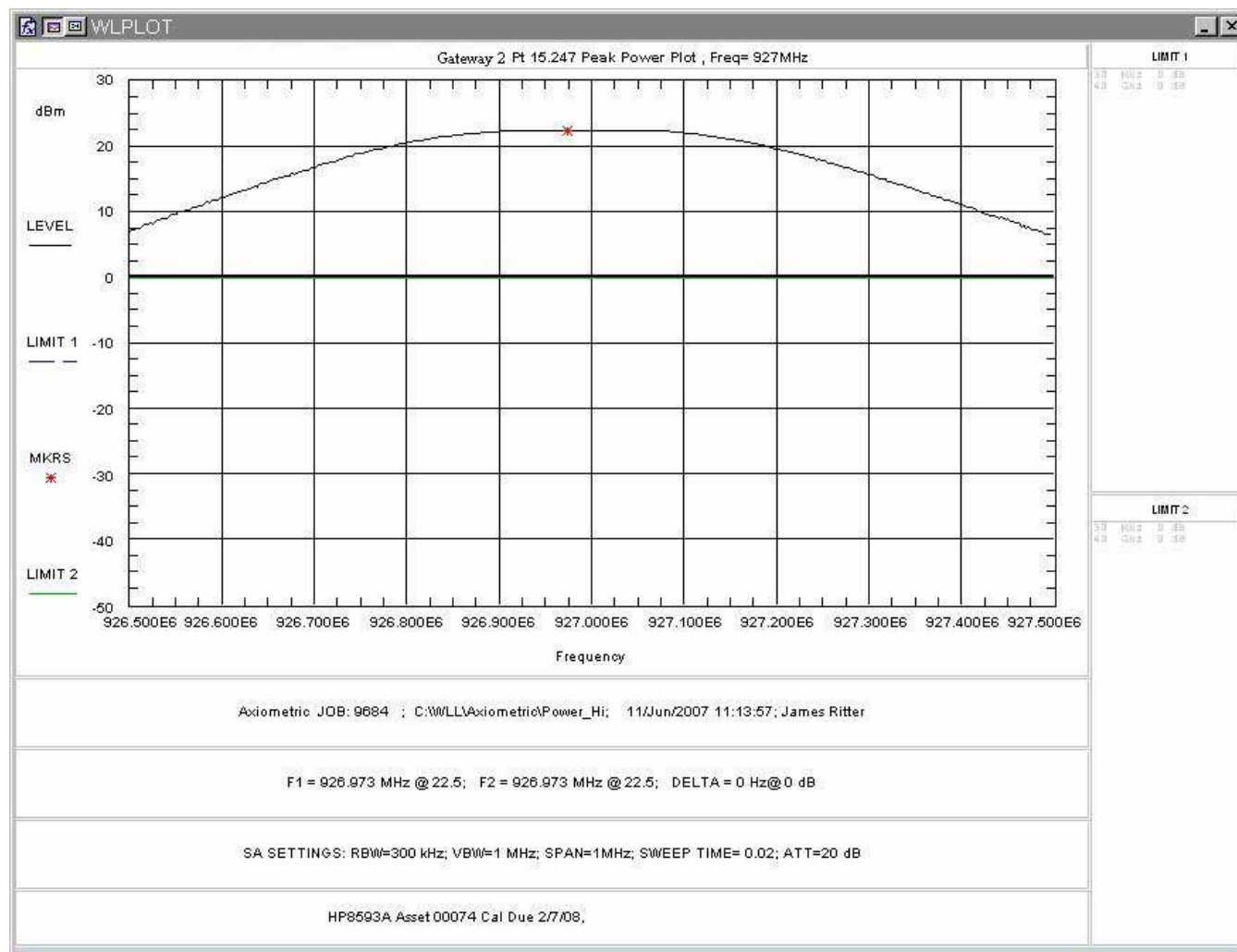


Figure 4-5. RF Peak Power, High Channel

4.3 Occupied Bandwidth: (FCC Part §2.1049)

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

For Frequency Hopping Spread Spectrum Systems, FCC Part 15.247 requires the maximum 20 dB bandwidth not exceed 250kHz.

At full modulation, the occupied bandwidth was measured as shown:

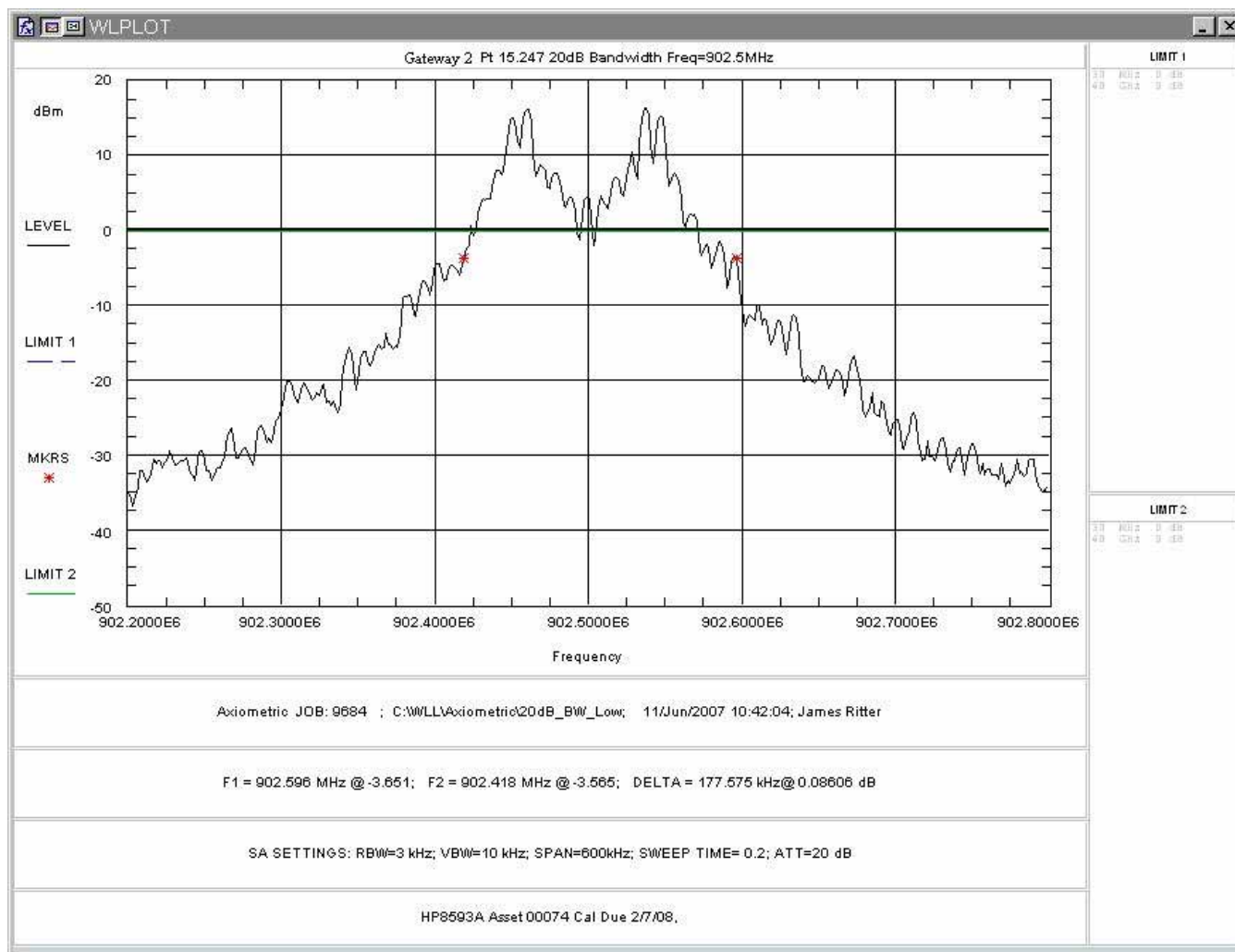


Figure 4-6. Occupied Bandwidth, Low Channel

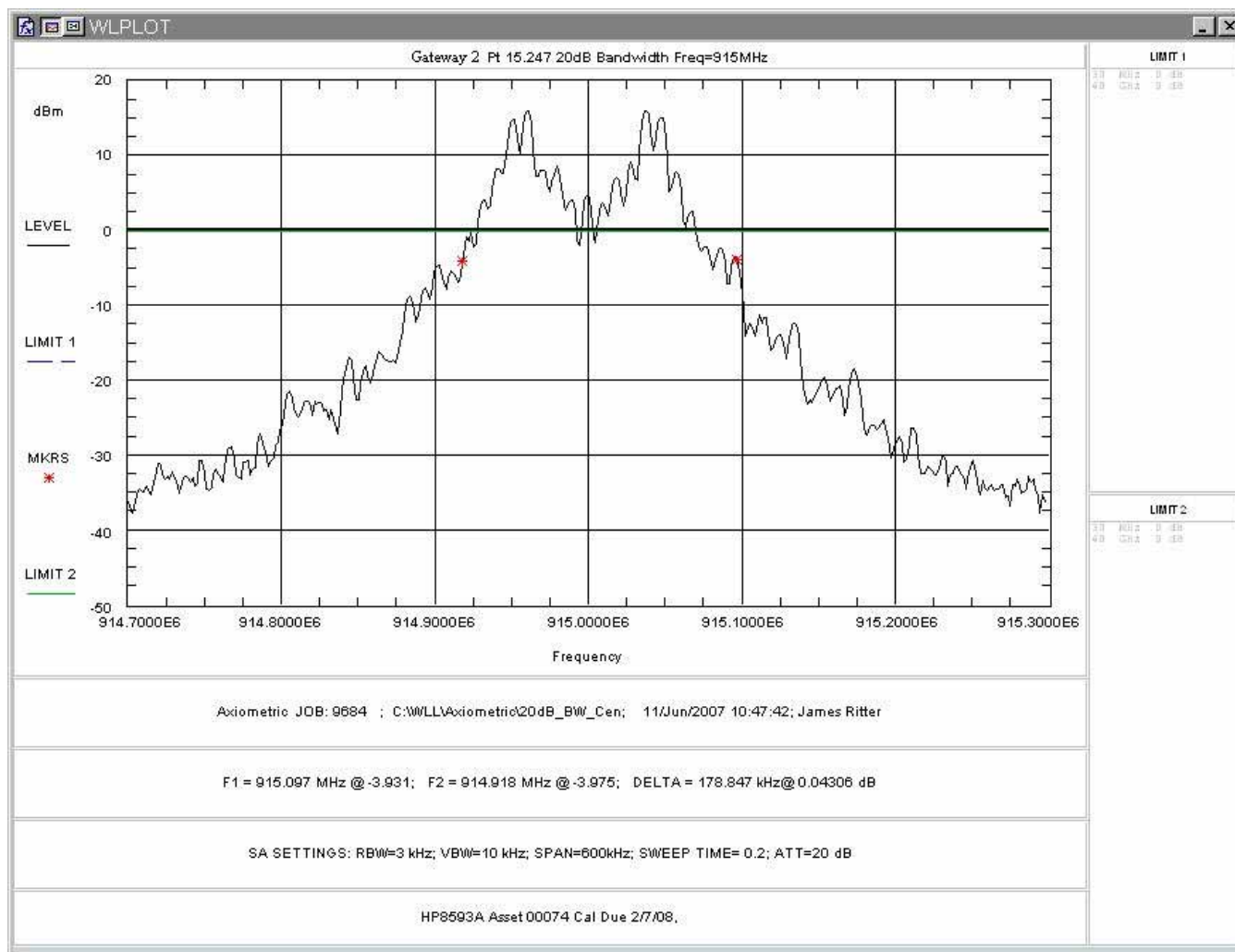


Figure 4-7. Occupied Bandwidth, Mid Channel

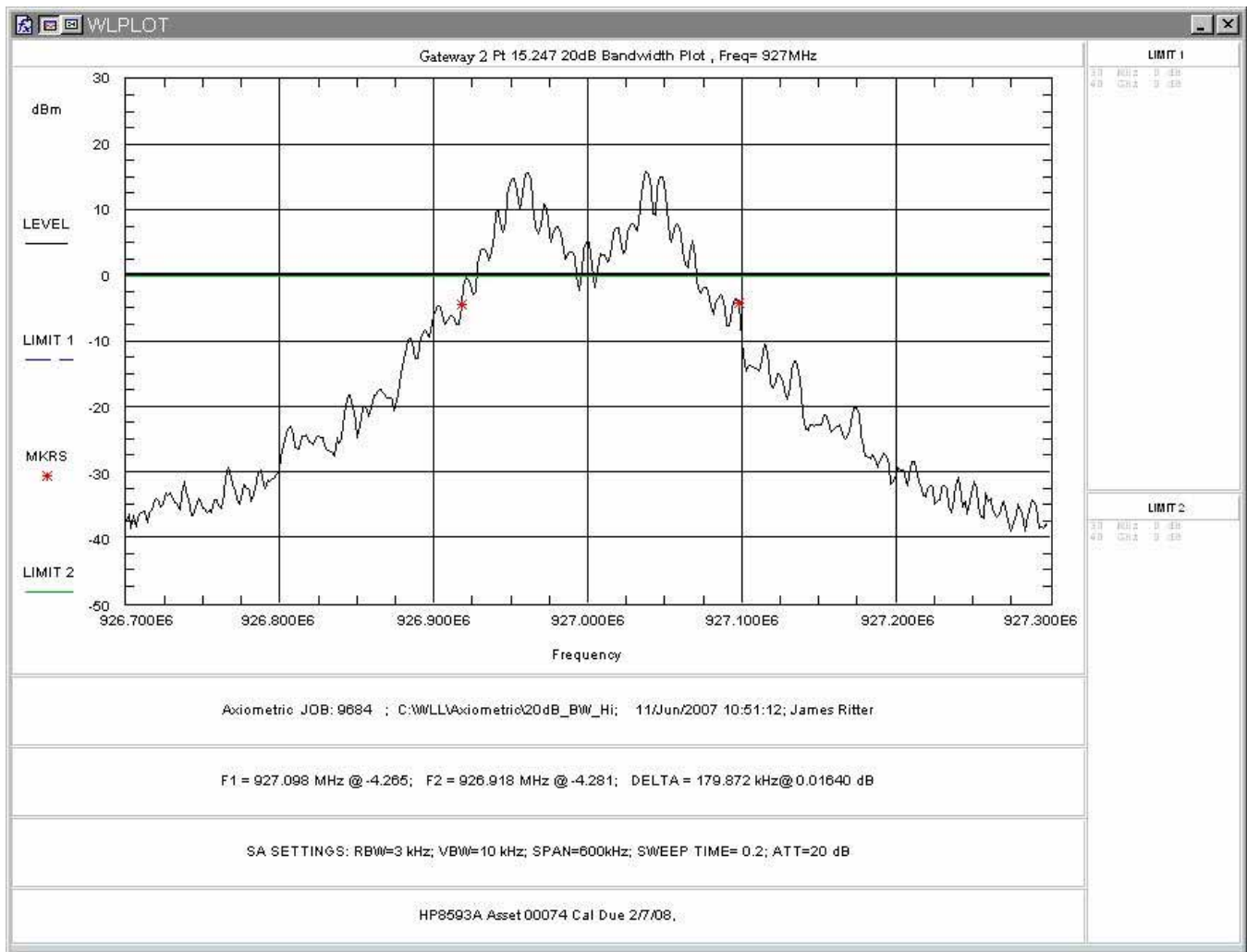


Figure 4-8. Occupied Bandwidth, High Channel

Table 4 provides a summary of the Occupied Bandwidth Results.

Table 4. Occupied Bandwidth Results

Frequency	Bandwidth	Limit	Pass/Fail
Low Channel: 902.5MHz	177.6 kHz	250 kHz	Pass
Mid Channel: 915.0MHz	178.9 kHz	250 kHz	Pass
High Channel: 927.0MHz	179.9 kHz	250 kHz	Pass

4.4 Channel Spacing and Number of Hop Channels (FCC Part §15247(a)(1))

Per the FCC requirements, frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth, whichever is greater. The maximum 20dB bandwidth measured is 179.9kHz so the channel spacing must be more than 179.9kHz. In addition, for a 900-928MHz with a 20dB Bandwidth less than 250 kHz the number of hopping channels shall at least 50 channels.

The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a 10 dB attenuator. An offset was programmed into the spectrum analyzer to compensate for the loss of the external attenuator. The spectrum analyzer resolution bandwidth was set to 30 kHz and the video bandwidth was set to 100 kHz. The channel spacing of 2 adjacent channels was measured using a spectrum analyzer span setting of 1.5MHz.

The following are plots of the channel spacing and number of hopping channels data. The channel spacing was measured to be 500 kHz and the number of channels used is 50.

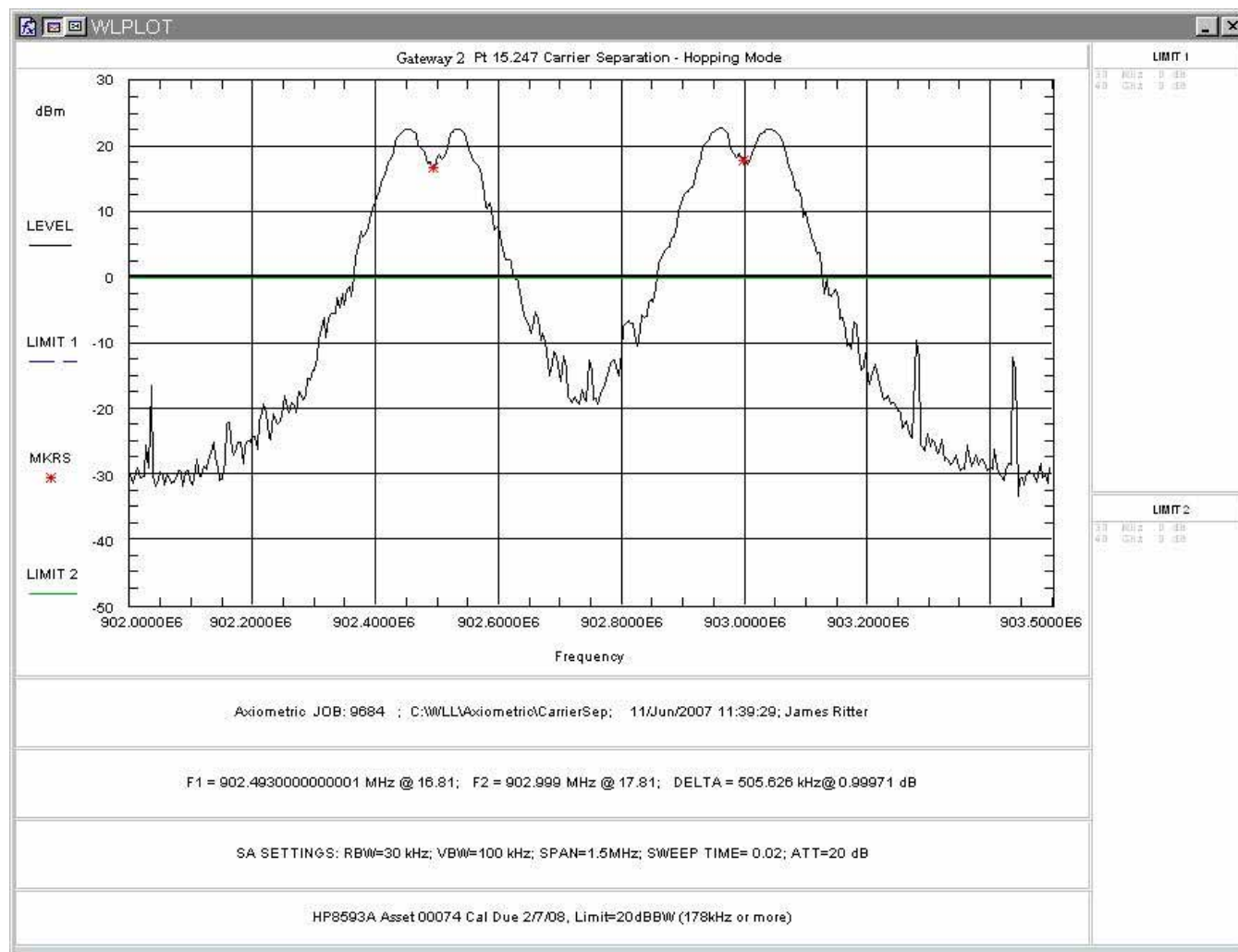


Figure 4-9. Channel Spacing, 500 kHz

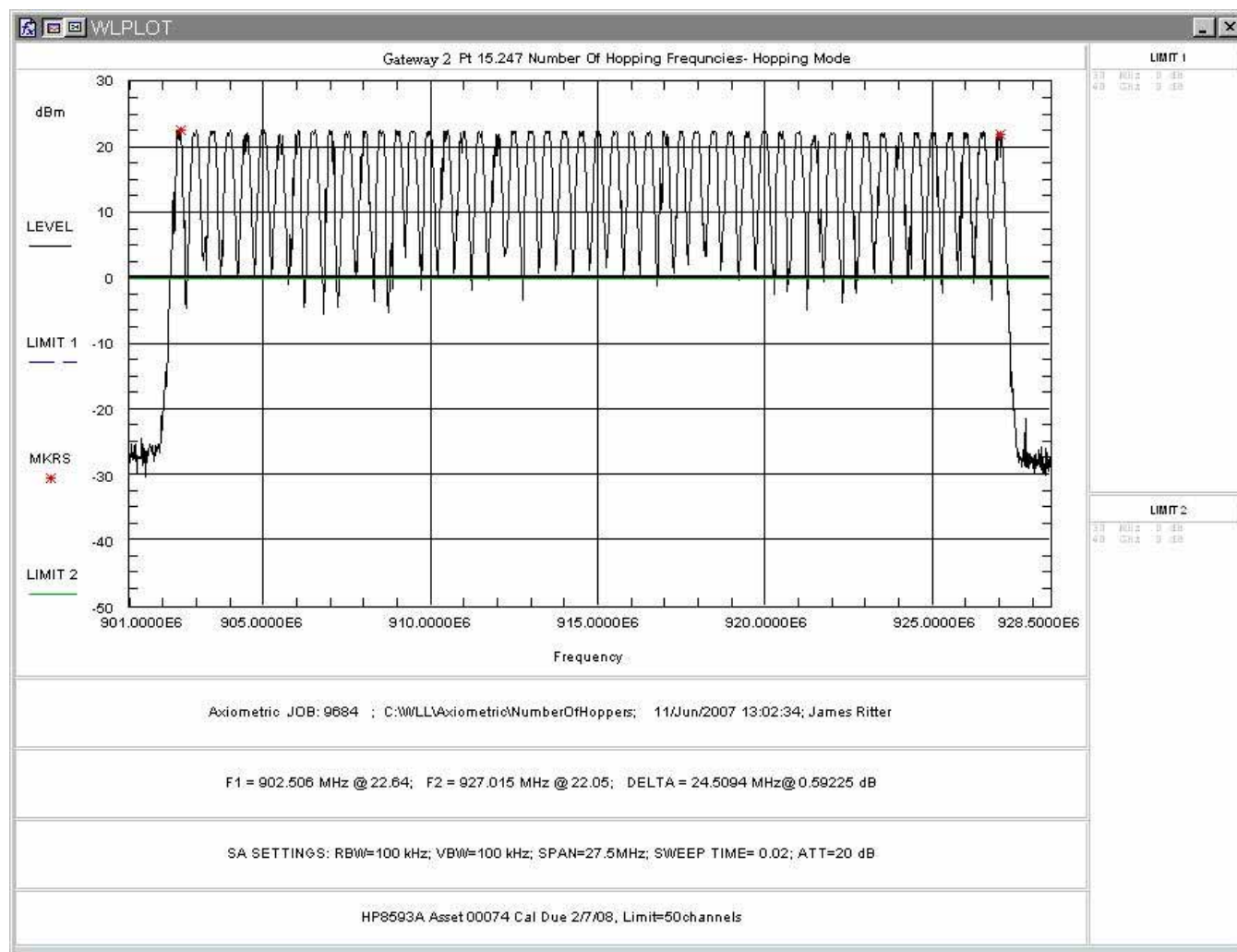


Figure 4-10. Number of Channels

4.5 Conducted Spurious Emissions at Antenna Terminals (FCC Part §2.1051)

The EUT must comply with requirements for spurious emissions at antenna terminals. Per §15.247(c) all spurious emissions in any 100 kHz bandwidth outside the frequency band in which the spread spectrum device is operating shall be attenuated 20 dB below the highest power level in a 100 kHz bandwidth within the band containing the highest level of the desired power.

The EUT antenna was removed and the cable was connected directly into a spectrum analyzer through a 10 dB attenuator. An offset was programmed into the spectrum analyzer to compensate for the loss of the external attenuator. The spectrum analyzer resolution bandwidth was set to 100 kHz and the video bandwidth was set to 100 kHz. The amplitude of the EUT carrier frequency was measured to determine the emissions limit (20 dB below the carrier frequency amplitude). The emissions outside of the allocated frequency band were then scanned from 30 MHz up to the tenth harmonic of the carrier.

The following are plots of the conducted spurious emissions data, presented by channel and including band-edge data.

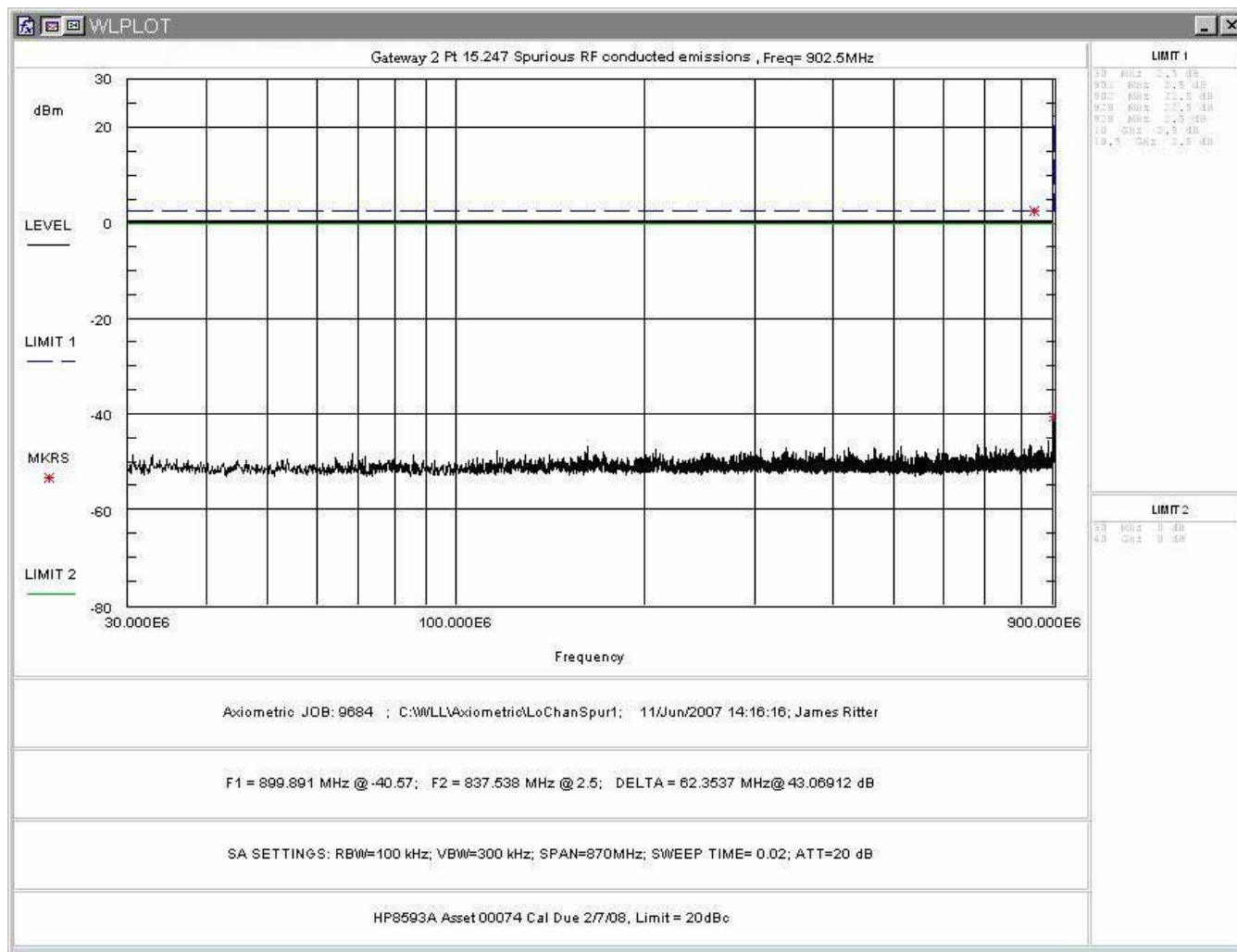


Figure 4-11. Conducted Spurious Emissions, Low Channel 30 - 900MHz

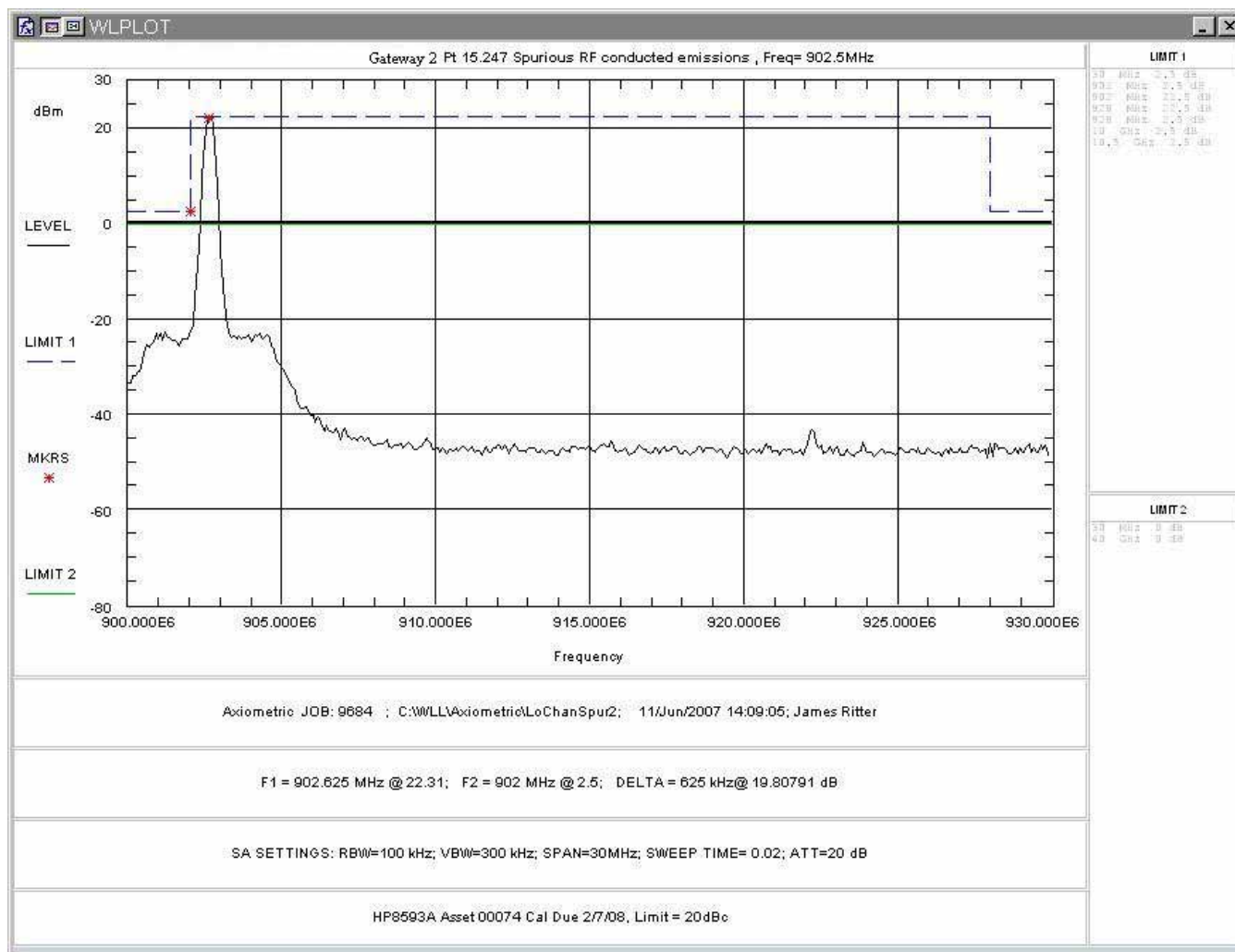


Figure 4-12. Conducted Spurious Emissions, Low Channel 900MHz-930MHz

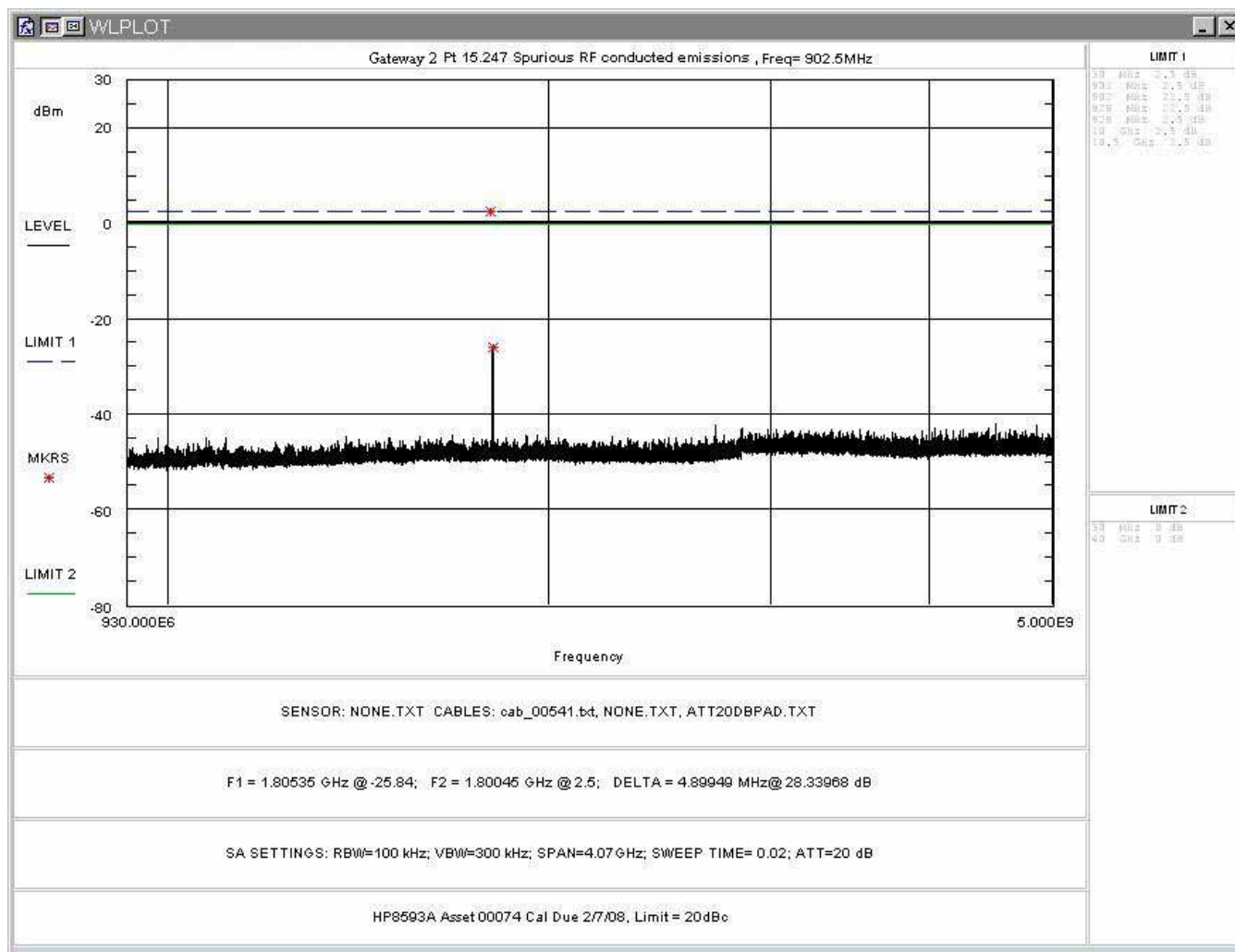


Figure 4-13. Conducted Spurious Emissions, Low Channel 930MHz – 5GHz

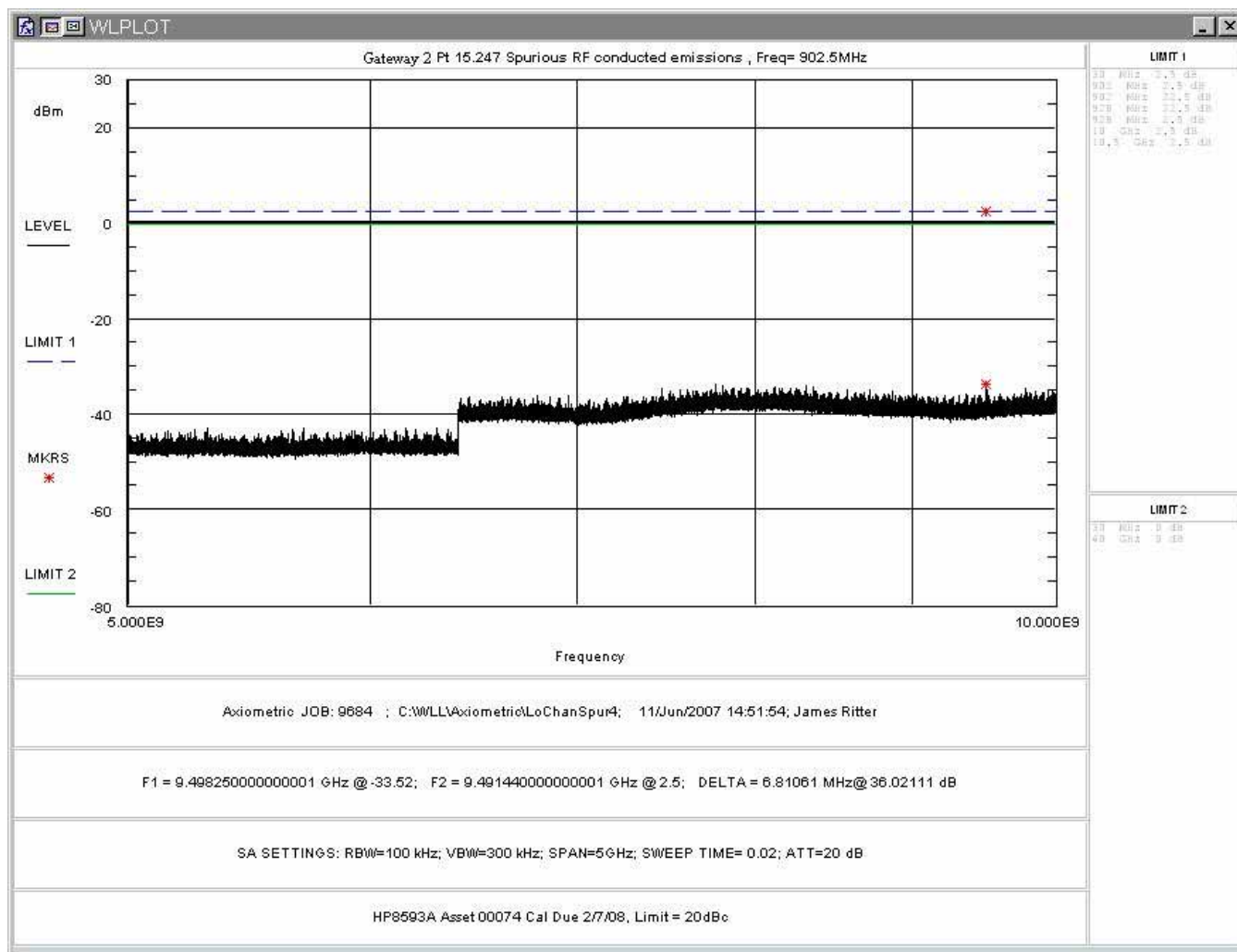


Figure 4-14. Conducted Spurious Emissions, Low Channel 5 - 10GHz

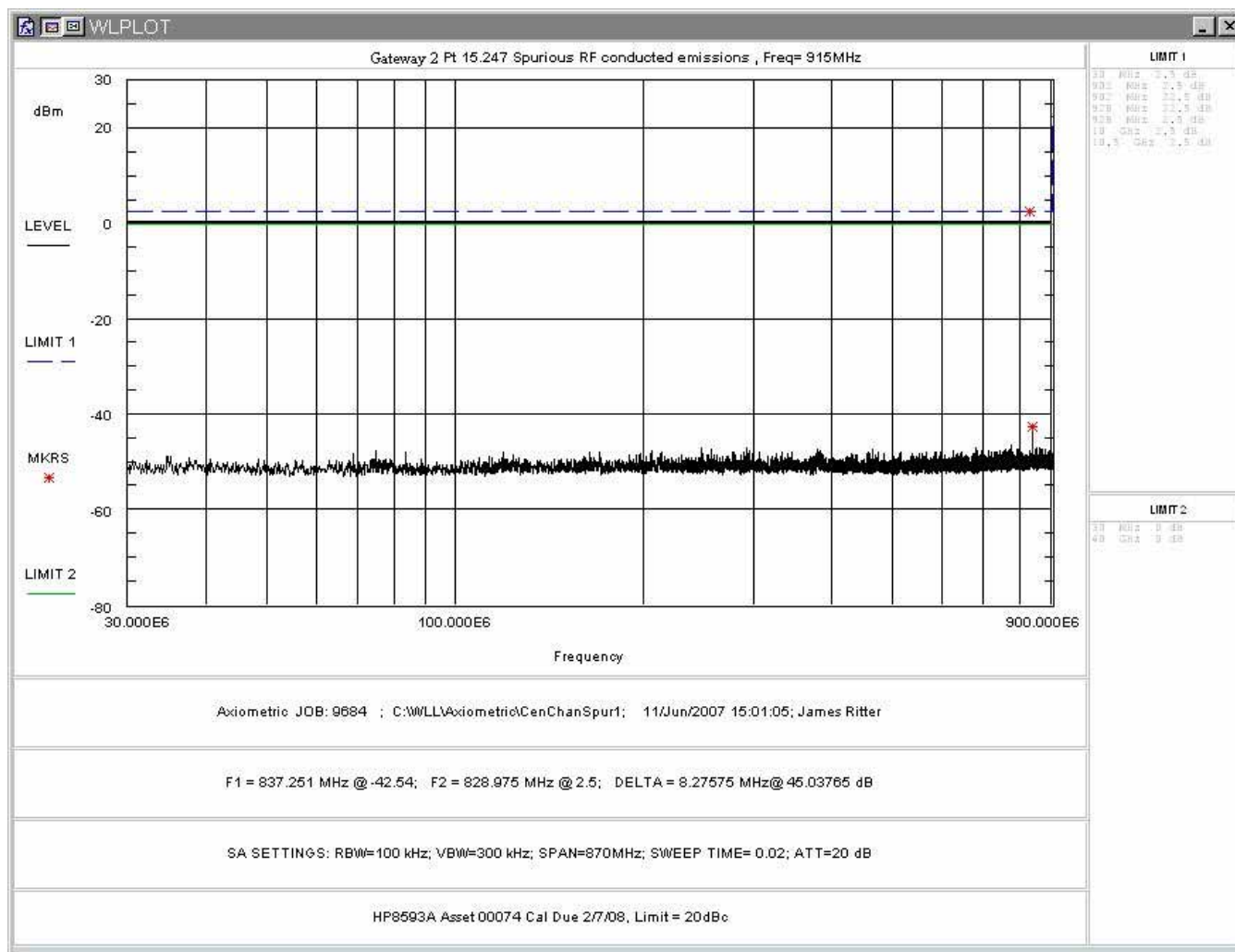


Figure 4-15. Conducted Spurious Emissions, Mid Channel 30 - 900MHz

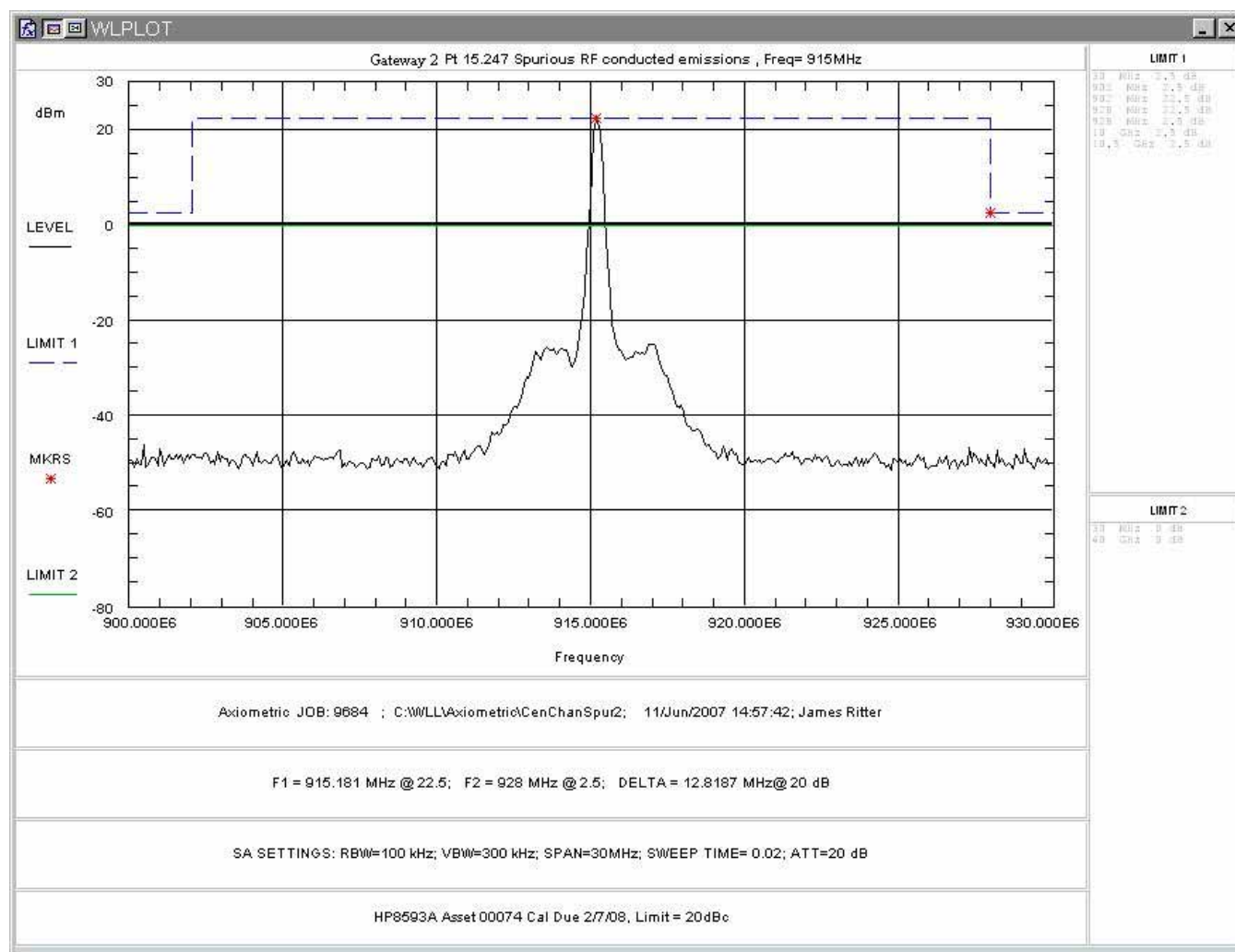


Figure 4-16. Conducted Spurious Emissions, Mid Channel 900 - 930MHz

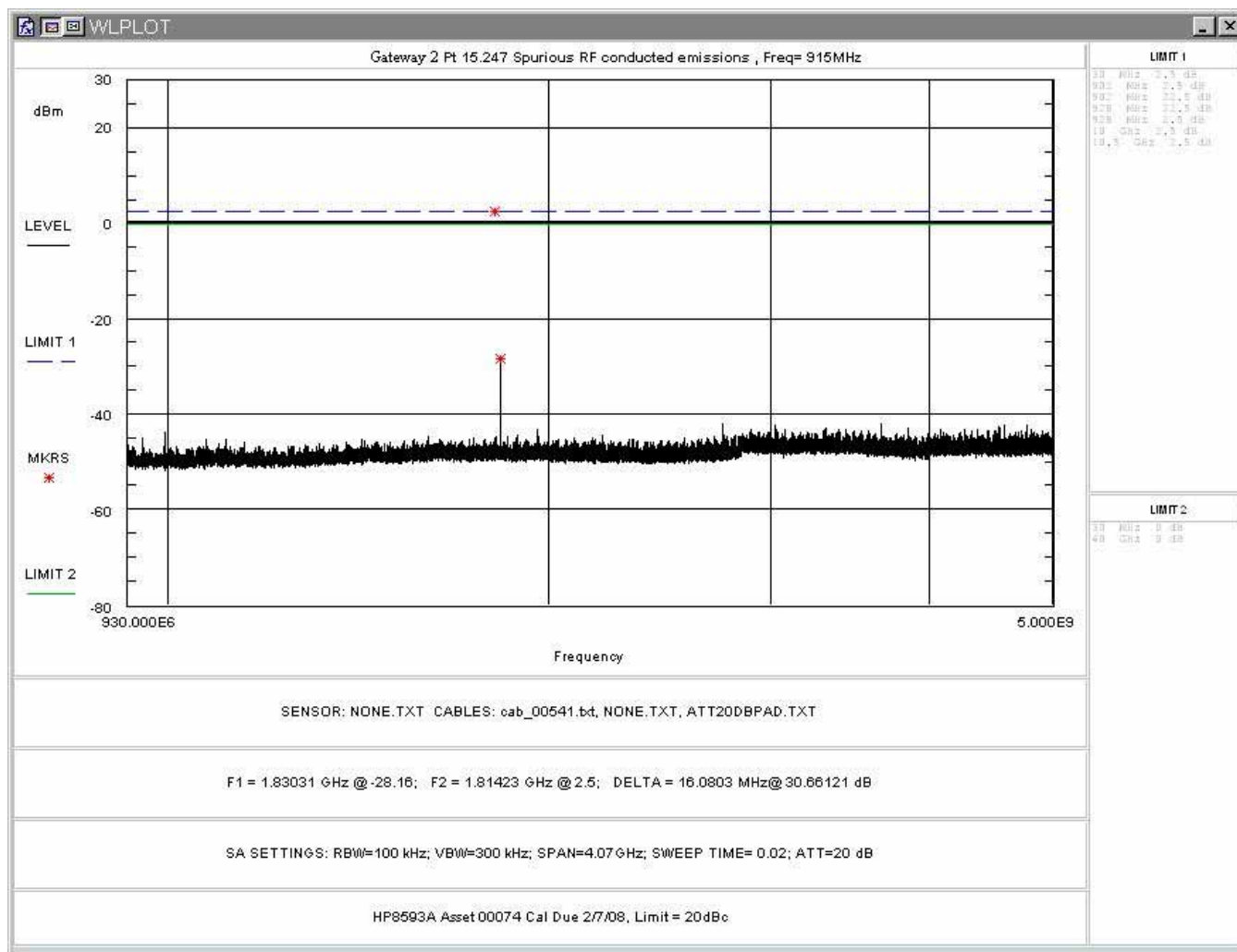


Figure 4-17. Conducted Spurious Emissions, Mid Channel 930MHz – 5GHz

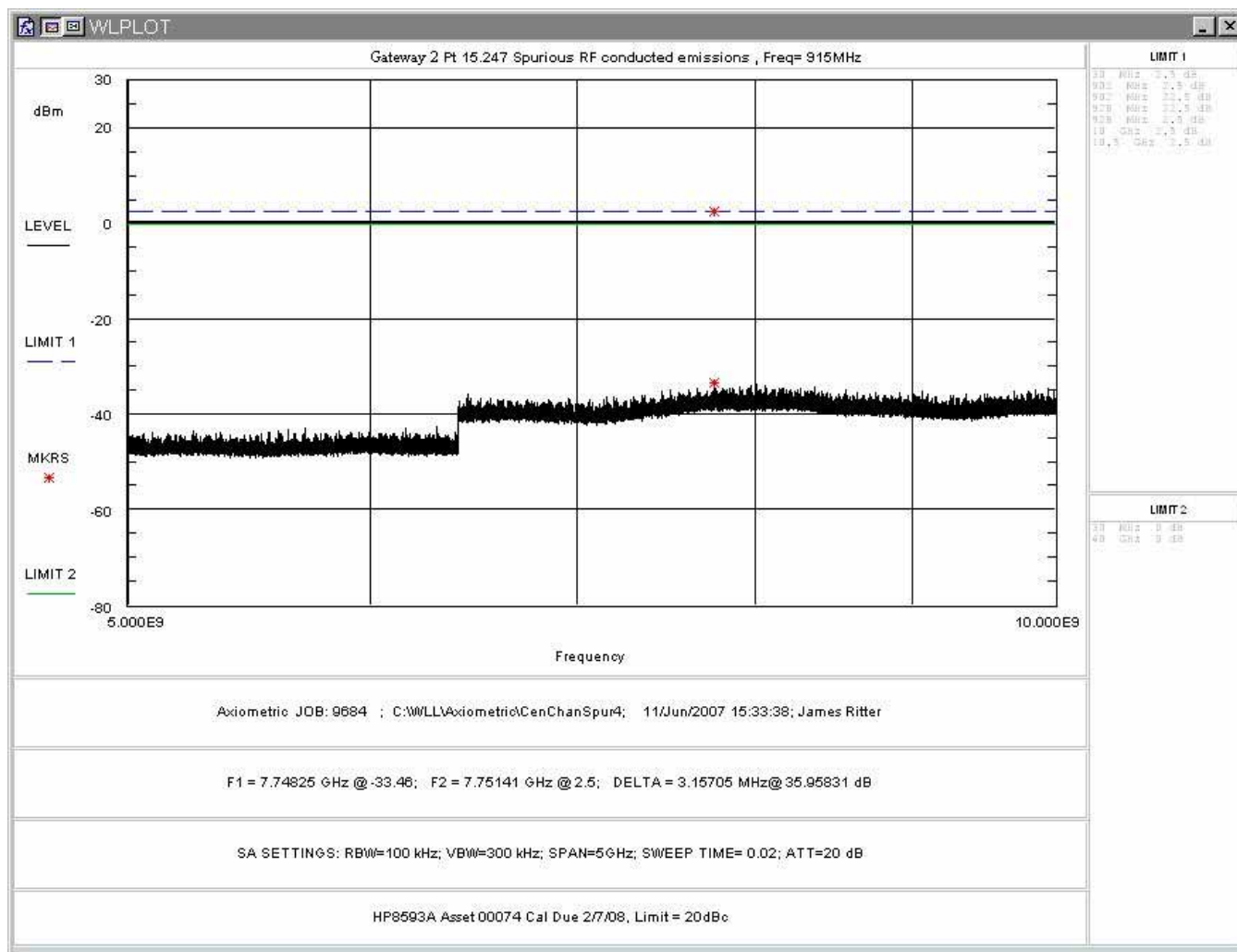


Figure 4-18. Conducted Spurious Emissions, Mid Channel 5 – 10GHz

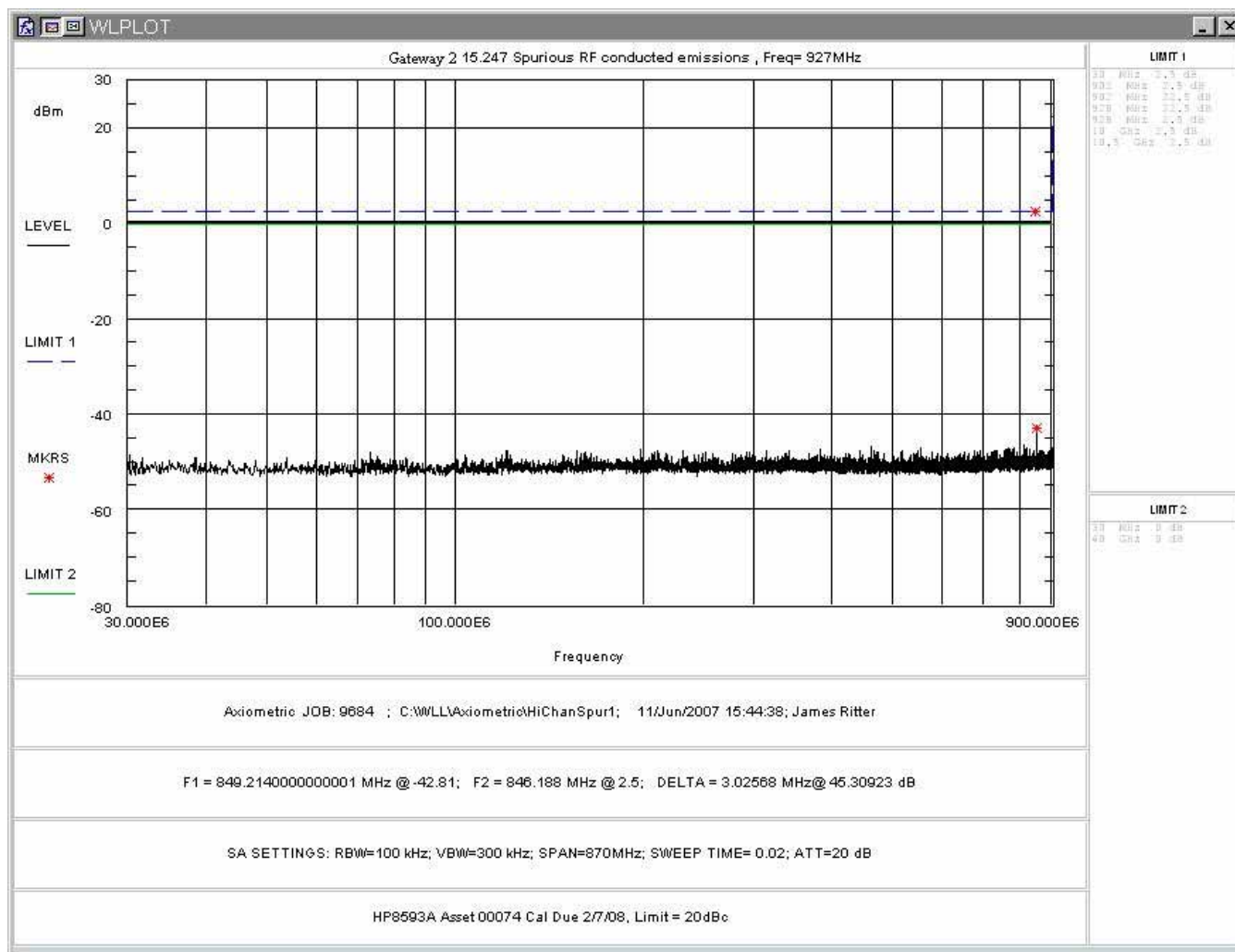


Figure 4-19. Conducted Spurious Emissions, High Channel 30 - 900MHz

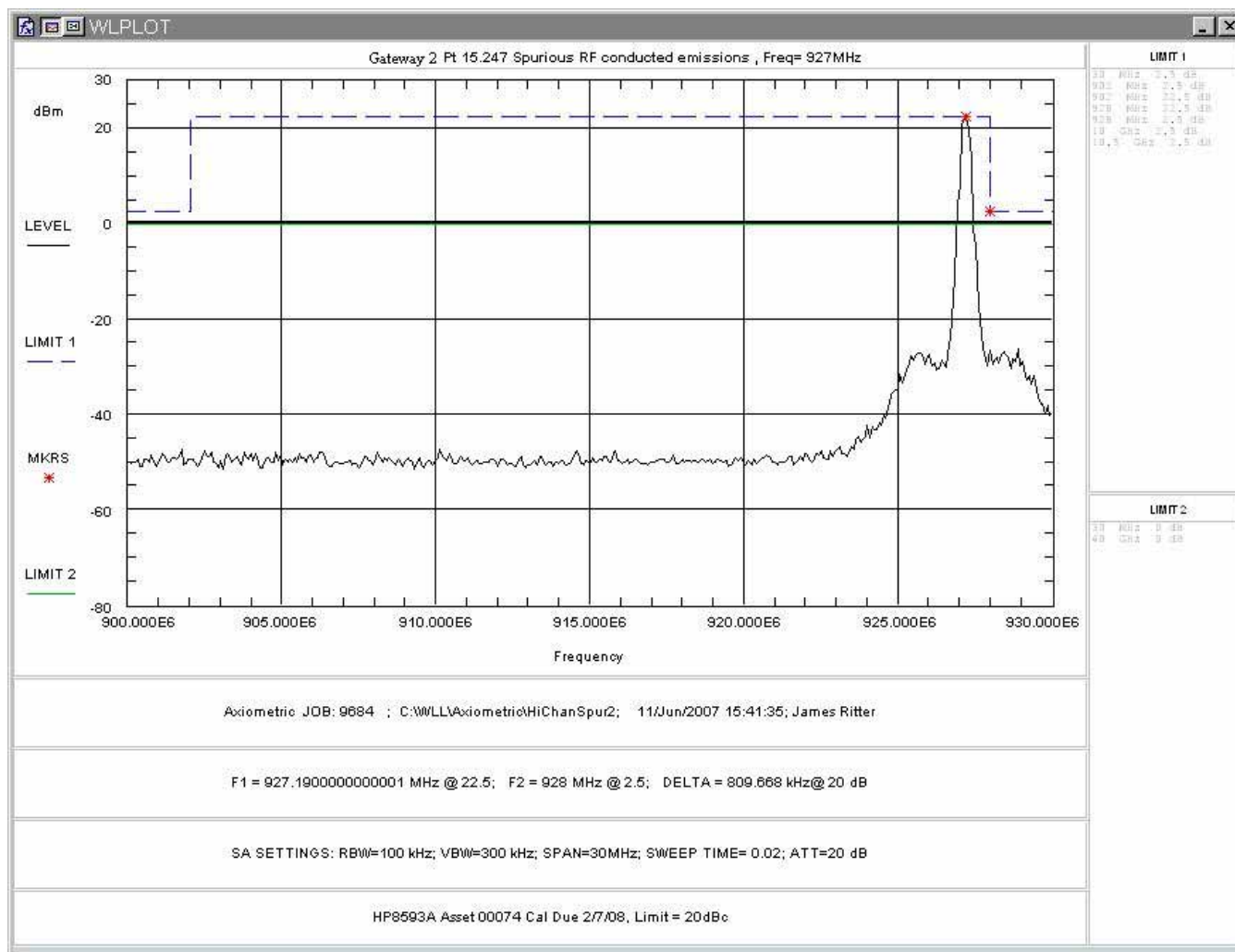


Figure 4-20. Conducted Spurious Emissions, High Channel 900 – 930MHz

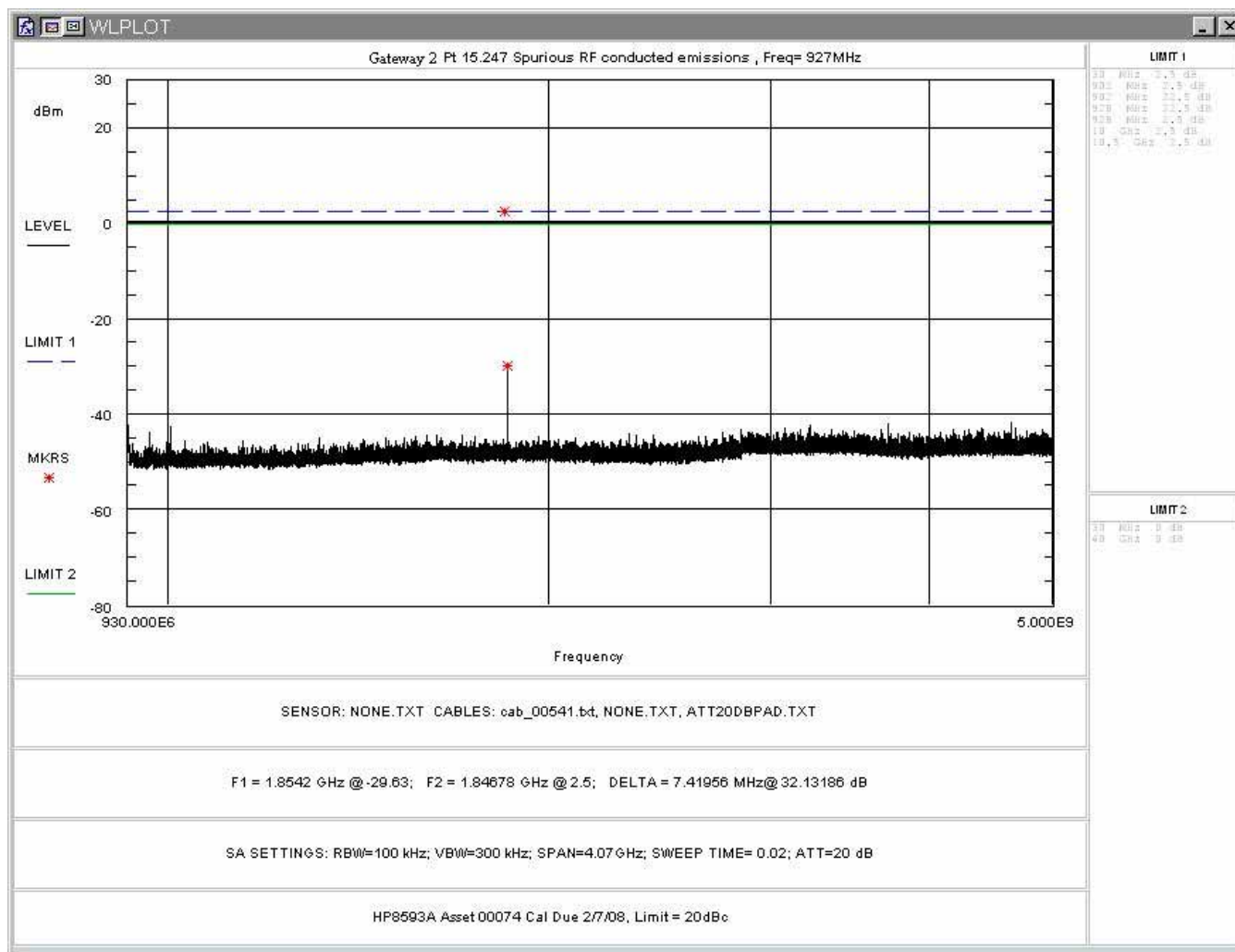


Figure 4-21. Conducted Spurious Emissions, High Channel 930MHz - 5GHz

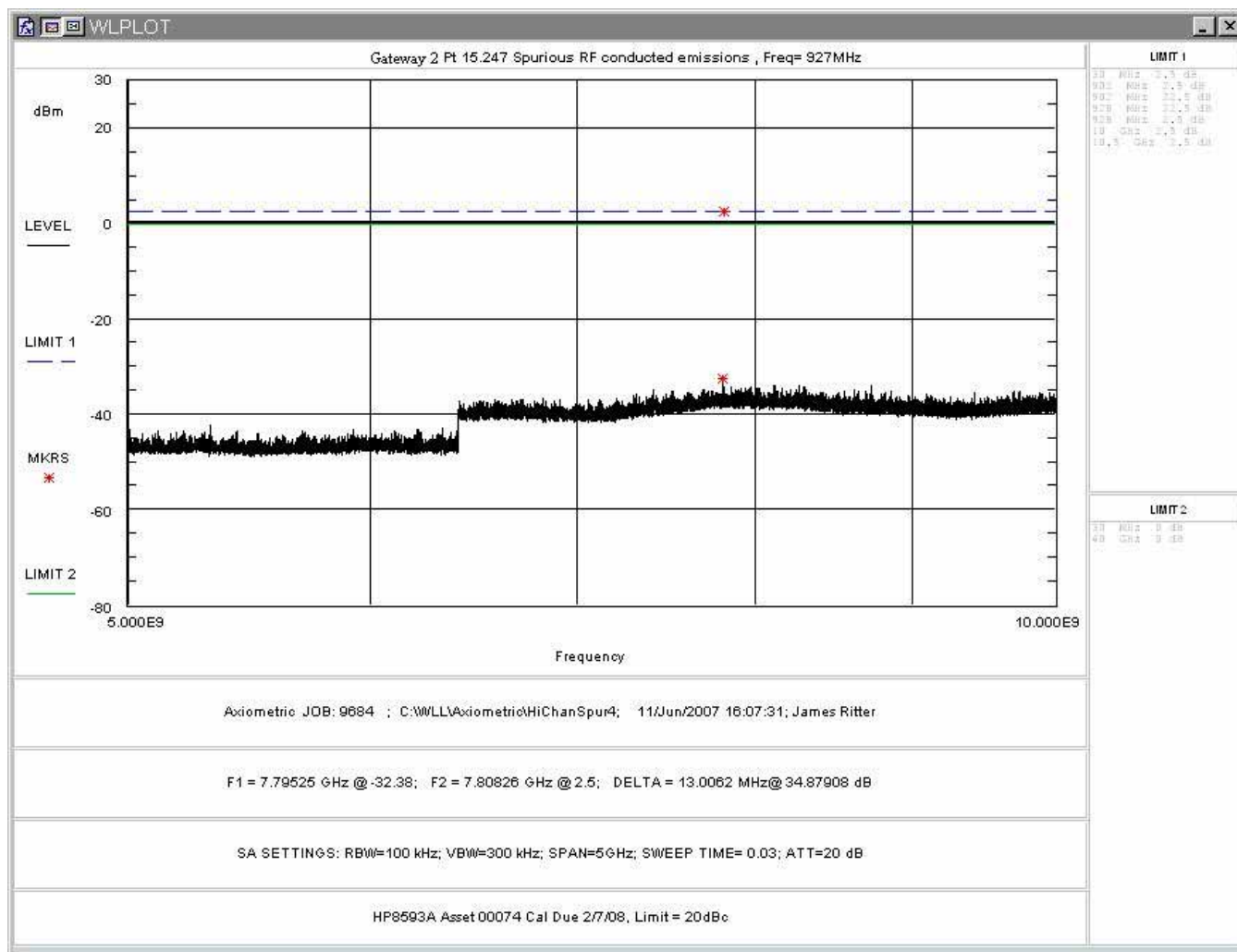


Figure 4-22. Conducted Spurious Emissions, High Channel 5 - 10GHz

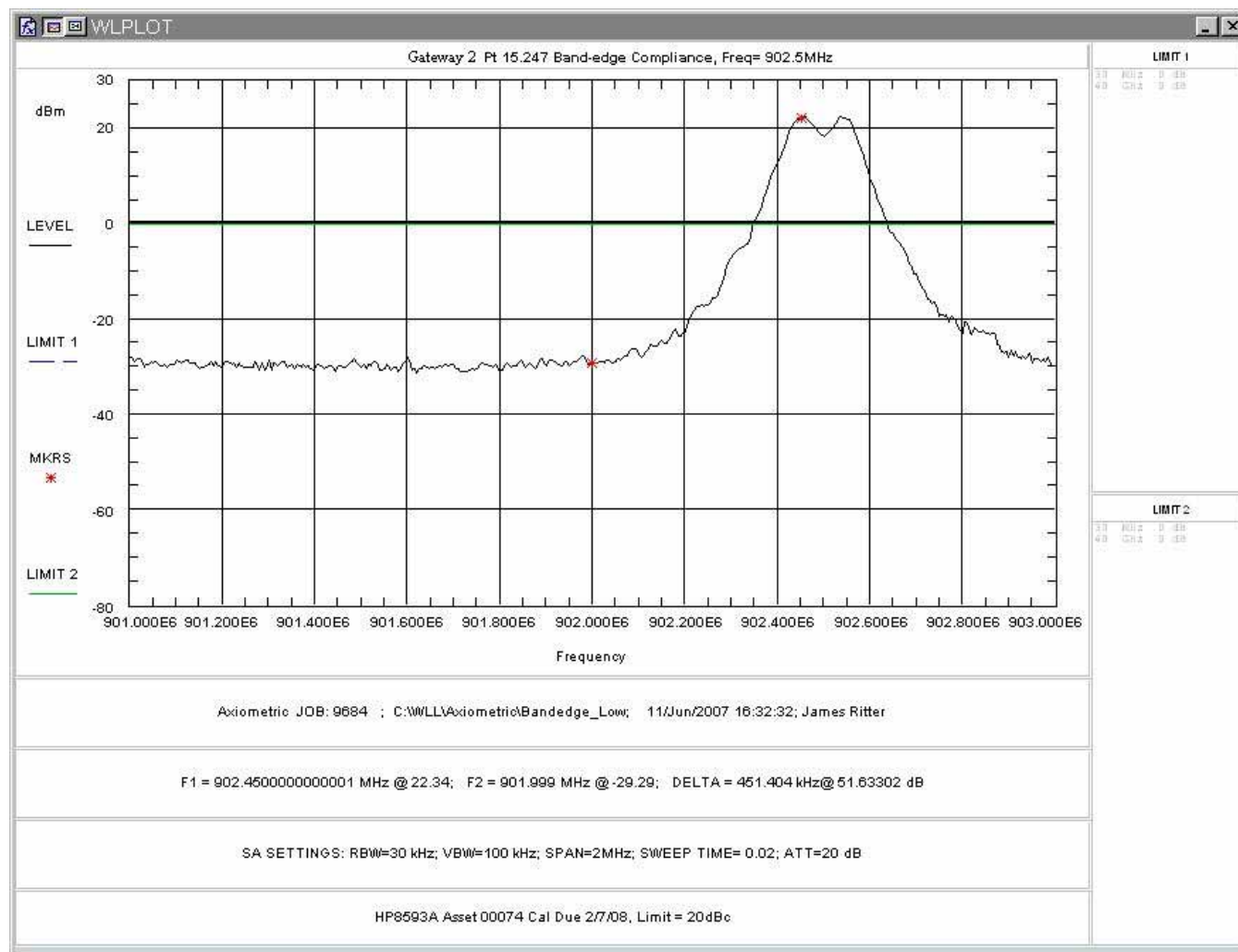
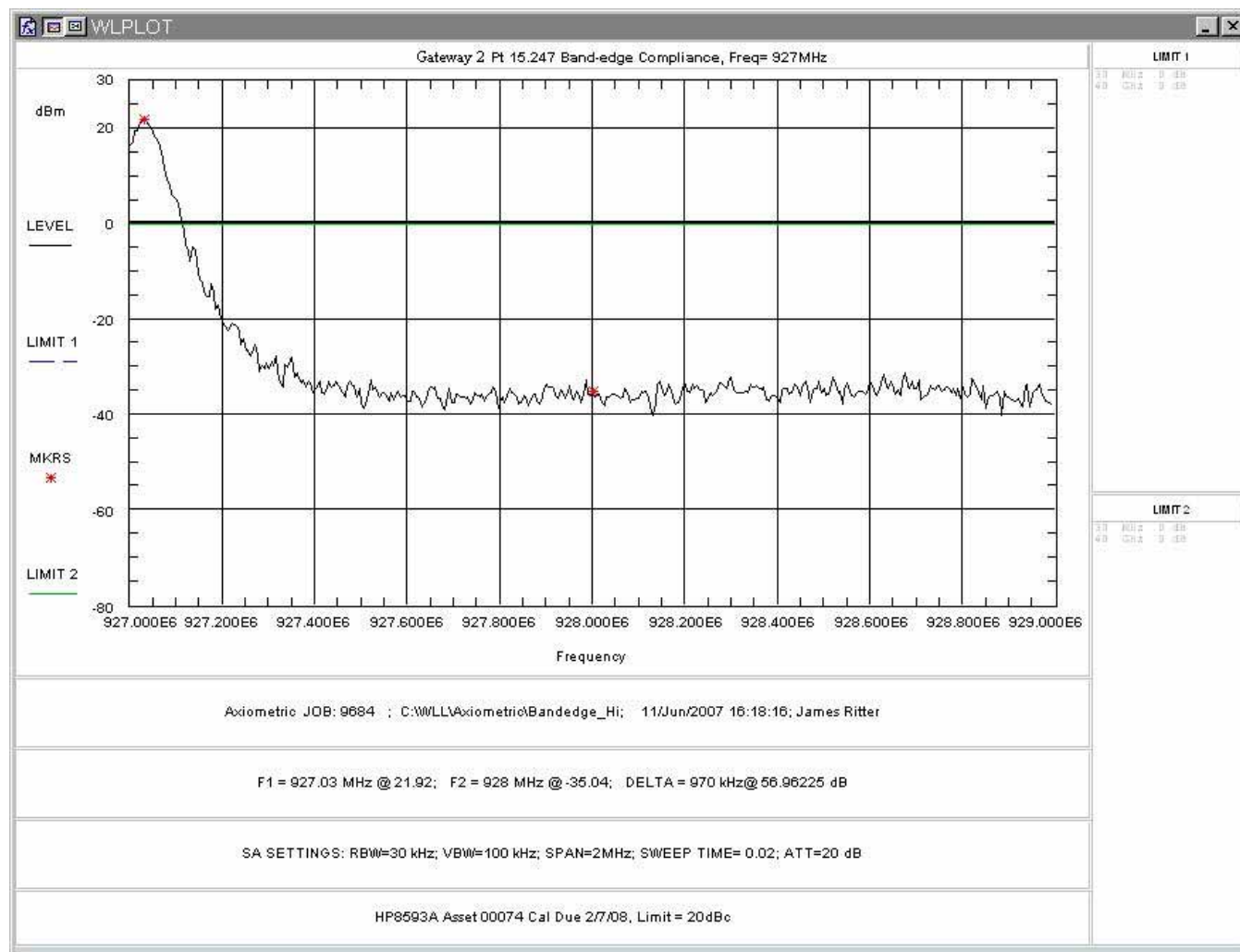


Figure 4-23. Lower Band Edge –Low Channel



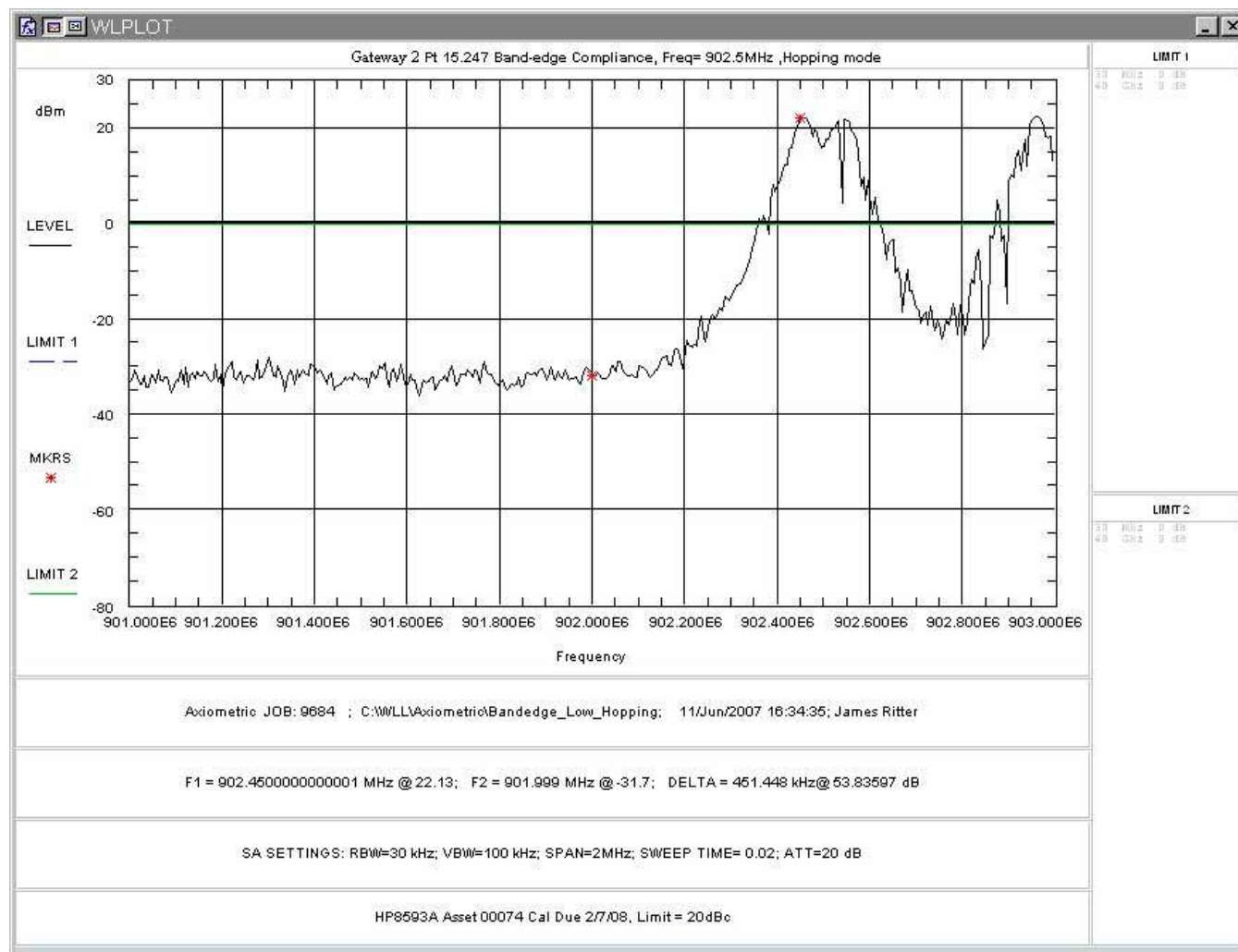


Figure 4-25. Lower Band Edge- Hopping Mode

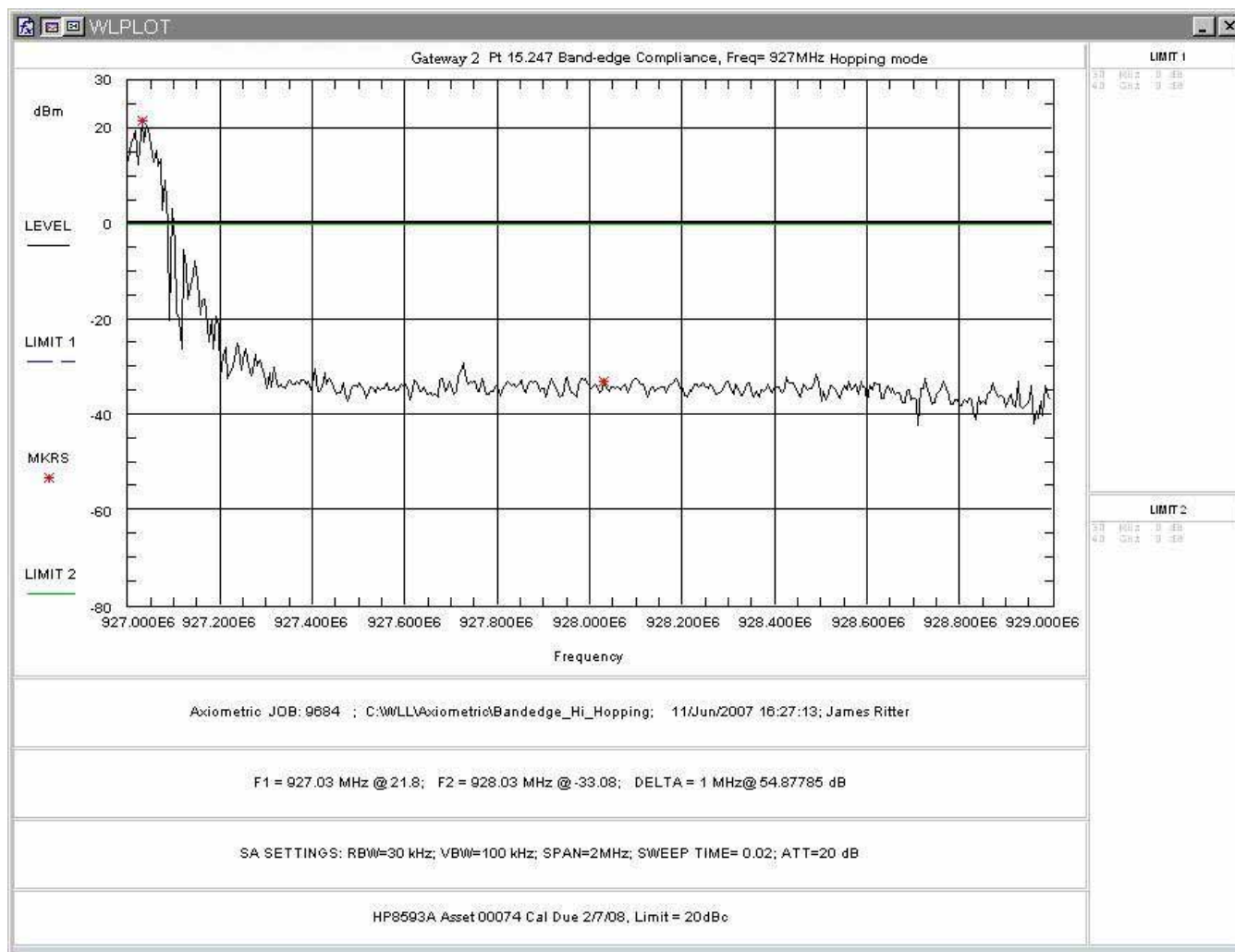


Figure 4-26. Upper Band Edge- Hopping Mode

4.6 Radiated Spurious Emissions: (FCC Part §2.1053)

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands. These emissions must meet the limits specified in §15.209 and §15.35(b) for peak measurements.

4.6.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. 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 C63.4-2001. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	120kHz	>100 kHz
>1000 MHz	1 MHz	<30 Hz (Avg.) 1MHz (Peak)

This test was performed for both Gateway II configuration option 1 and 2.

Table 5: Radiated Emission Test Data- Low Channel @ 902.5MHz Config. 1
(Restricted Bands)

Transmitting at 902.5MHz w/ 5.5dBi whip antenna Unit mounts Vertically

<1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
73.979	V	0.0	1.0	5.1	7.5	1.5	0.0	14.1	5.1	100.0	-25.9
75.900	V	0.0	1.0	3.8	7.4	1.5	0.0	12.7	4.3	100.0	-27.3
109.140	V	90.0	1.3	5.9	11.0	1.7	0.0	18.6	8.5	150.0	-24.9
117.000	V	180.0	1.0	4.4	11.6	1.7	0.0	17.7	7.7	150.0	-25.8
133.130	V	270.0	1.2	11.6	10.6	2.1	0.0	24.3	16.4	150.0	-19.2
169.124	V	0.0	1.3	7.0	10.1	2.3	0.0	19.4	9.3	150.0	-24.1
212.200	V	90.0	2.4	9.8	11.6	2.1	0.0	23.5	14.9	150.0	-20.1
242.980	V	270.0	2.2	10.4	13.1	2.9	0.0	26.4	20.9	200.0	-19.6
249.171	V	180.0	1.3	5.7	13.3	2.9	0.0	21.9	12.4	200.0	-24.1
270.600	V	180.0	1.5	8.0	14.7	3.0	0.0	25.7	19.3	200.0	-20.3
273.000	V	90.0	2.0	3.8	14.9	3.0	0.0	21.7	12.1	200.0	-24.4
420.550	V	190.0	2.0	7.9	15.9	3.8	0.0	27.6	24.1	200.0	-18.4
961.950	V	180.0	1.3	12.1	22.2	6.8	0.0	41.1	114.1	500.0	-12.8
980.440	V	180.0	1.3	17.0	22.4	6.8	0.0	46.2	203.4	500.0	-7.8
73.979	H	270.0	2.6	7.7	7.5	1.5	0.0	16.7	6.8	100.0	-23.3
108.335	H	180.0	2.5	5.6	10.9	1.7	0.0	18.2	8.1	150.0	-25.3
117.000	H	0.0	3.3	1.2	11.6	1.7	0.0	14.5	5.3	150.0	-29.0
133.130	H	270.0	3.0	3.7	10.6	2.1	0.0	16.4	6.6	150.0	-27.1
169.124	H	270.0	3.0	3.8	10.1	2.3	0.0	16.2	6.5	150.0	-27.3
242.980	H	0.0	1.7	4.9	13.1	2.9	0.0	20.9	11.1	200.0	-25.1
420.550	H	180.0	2.6	4.2	15.9	3.8	0.0	23.9	15.8	200.0	-22.1
961.950	H	0.0	1.6	5.9	22.2	6.8	0.0	34.9	55.9	500.0	-19.0
980.440	H	0.0	1.2	10.4	22.4	6.8	0.0	39.6	95.1	500.0	-14.4

>1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
Peak											
2707.500	V	180.0	1.0	51.2	29.5	1.5	36.0	46.2	203.5	5000.0	-27.8
3610.000	V	160.0	1.0	48.2	30.7	2.5	35.6	45.8	194.5	5000.0	-28.2
4512.500	V	160.0	1.0	44.5	32.0	3.3	35.5	44.4	165.1	5000.0	-29.6
5415.000	V	180.0	1.0	44.8	33.5	3.8	35.6	46.5	211.9	5000.0	-27.5
8122.500	V	180.0	1.0	42.7	37.4	6.1	35.8	50.3	328.3	5000.0	-23.7
9025.000	V	160.0	1.0	49.5	38.0	4.8	36.1	56.2	645.8	5000.0	-17.8
1071.900	V	0.0	1.0	52.1	24.9	1.2	37.6	40.7	108.4	5000.0	-33.3
2707.500	H	220.0	1.0	47.5	29.5	1.5	36.0	42.5	133.4	5000.0	-31.5
3610.000	H	180.0	1.0	50.2	30.7	2.5	35.6	47.8	244.9	5000.0	-26.2

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
4512.500	H	225.0	1.0	44.5	32.0	3.3	35.5	44.4	165.1	5000.0	-29.6
5415.000	H	225.0	1.0	49.7	33.5	3.8	35.6	51.4	370.0	5000.0	-22.6
8122.500	H	250.0	1.0	43.0	37.4	6.1	35.8	50.7	341.0	5000.0	-23.3
9025.000	H	200.0	1.0	48.5	38.0	4.8	36.1	55.2	575.6	5000.0	-18.8
1071.900	H	0.0	1.0	47.5	24.9	1.2	37.6	36.1	63.8	5000.0	-37.9
Average											
2707.500	V	180.0	1.0	48.3	29.5	1.5	36.0	43.3	146.7	500.0	-10.6
3610.000	V	160.0	1.0	41.3	30.7	2.5	35.6	38.9	88.5	500.0	-15.0
4512.500	V	160.0	1.0	35.5	32.0	3.3	35.5	35.4	58.6	500.0	-18.6
5415.000	V	180.0	1.0	35.2	33.5	3.8	35.6	36.8	69.5	500.0	-17.1
8122.500	V	180.0	1.0	31.3	37.4	6.1	35.8	39.0	88.7	500.0	-15.0
9025.000	V	160.0	1.0	40.2	38.0	4.8	36.1	46.9	220.6	500.0	-7.1
1071.900	V	0.0	1.0	42.7	24.9	1.2	37.6	31.3	36.6	500.0	-22.7
2707.500	H	220.0	1.0	40.5	29.5	1.5	36.0	35.5	59.6	500.0	-18.5
3610.000	H	180.0	1.0	45.5	30.7	2.5	35.6	43.1	143.1	500.0	-10.9
4512.500	H	225.0	1.0	34.7	32.0	3.3	35.5	34.6	53.4	500.0	-19.4
5415.000	H	225.0	1.0	45.5	33.5	3.8	35.6	47.2	228.9	500.0	-6.8
8122.500	H	250.0	1.0	32.5	37.4	6.1	35.8	40.2	101.8	500.0	-13.8
9025.000	H	200.0	1.0	38.4	38.0	4.8	36.1	45.1	179.9	500.0	-8.9
1071.900	H	0.0	1.0	35.7	24.9	1.2	37.6	24.3	16.4	500.0	-29.7

Table 6: Radiated Emission Test Data- Center Channel @ 915MHz Config. 1

Transmitting at 915MHz w/ 5.5dBi whip antenna Unit mounts Vertically

<1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
73.979	V	0.0	1.0	5.1	7.5	1.5	0.0	14.1	5.1	100.0	-25.9
75.900	V	0.0	1.0	3.8	7.4	1.5	0.0	12.7	4.3	100.0	-27.3
109.140	V	90.0	1.3	5.9	11.0	1.7	0.0	18.6	8.5	150.0	-24.9
117.000	V	180.0	1.0	4.4	11.6	1.7	0.0	17.7	7.7	150.0	-25.8
133.130	V	270.0	1.2	11.6	10.6	2.1	0.0	24.3	16.4	150.0	-19.2
169.124	V	0.0	1.3	7.0	10.1	2.3	0.0	19.4	9.3	150.0	-24.1
212.200	V	90.0	2.4	9.8	11.6	2.1	0.0	23.5	14.9	150.0	-20.1
242.980	V	270.0	2.2	10.4	13.1	2.9	0.0	26.4	20.9	200.0	-19.6
249.171	V	180.0	1.3	5.7	13.3	2.9	0.0	21.9	12.4	200.0	-24.1
270.600	V	180.0	1.5	8.0	14.7	3.0	0.0	25.7	19.3	200.0	-20.3
273.000	V	90.0	2.0	3.8	14.9	3.0	0.0	21.7	12.1	200.0	-24.4
420.550	V	190.0	2.0	7.9	15.9	3.8	0.0	27.6	24.1	200.0	-18.4
993.028	V	180.0	1.6	15.2	22.5	6.8	0.0	44.5	168.2	500.0	-9.5
73.979	H	270.0	2.6	7.7	7.5	1.5	0.0	16.7	6.8	100.0	-23.3
108.335	H	180.0	2.5	5.6	10.9	1.7	0.0	18.2	8.1	150.0	-25.3
117.000	H	0.0	3.3	1.2	11.6	1.7	0.0	14.5	5.3	150.0	-29.0
133.130	H	270.0	3.0	3.7	10.6	2.1	0.0	16.4	6.6	150.0	-27.1
169.124	H	270.0	3.0	3.8	10.1	2.3	0.0	16.2	6.5	150.0	-27.3
242.980	H	0.0	1.7	4.9	13.1	2.9	0.0	20.9	11.1	200.0	-25.1
420.550	H	180.0	2.6	4.2	15.9	3.8	0.0	23.9	15.8	200.0	-22.1
993.028	H	0.0	2.5	6.4	22.5	6.8	0.0	35.7	61.1	500.0	-18.3

>1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
Peak											
2745.000	H	180.0	1.0	47.0	29.6	1.5	36.0	42.1	127.1	5000.0	-31.9
3660.000	H	200.0	1.0	50.2	30.8	2.5	35.5	47.9	249.1	5000.0	-26.1
4575.000	H	180.0	1.0	46.5	32.1	3.4	35.5	46.5	211.0	5000.0	-27.5
7320.000	H	270.0	1.0	48.7	37.1	4.5	35.8	54.5	531.2	5000.0	-19.5
8235.000	H	180.0	1.0	43.6	37.5	5.9	35.9	51.1	360.0	5000.0	-22.9
9150.000	H	270.0	1.0	49.6	38.1	4.8	36.2	56.4	660.4	5000.0	-17.6
1092.230	H	180.0	1.0	53.2	25.0	1.3	37.5	41.9	124.5	5000.0	-32.1
2745.000	V	90.0	1.0	47.0	29.6	1.5	36.0	42.1	127.1	5000.0	-31.9
3660.000	V	180.0	1.0	50.2	30.8	2.5	35.5	47.9	248.5	5000.0	-26.1
4575.000	V	200.0	1.0	48.7	32.1	3.4	35.5	48.7	270.9	5000.0	-25.3
7320.000	V	180.0	1.0	50.0	37.1	4.5	35.8	55.8	619.1	5000.0	-18.1
8235.000	V	190.0	1.0	44.0	37.5	5.9	35.9	51.5	376.9	5000.0	-22.5
9150.000	V	190.0	1.0	51.0	38.1	4.8	36.2	57.8	775.9	5000.0	-16.2

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
1092.230	V	180.0	1.0	49.0	25.0	1.3	37.5	37.7	77.1	5000.0	-36.2
Average											
2745.000	H	180.0	1.0	38.5	29.6	1.5	36.0	33.6	47.8	500.0	-20.4
3660.000	H	200.0	1.0	46.0	30.8	2.5	35.5	43.8	154.1	500.0	-10.2
4575.000	H	180.0	1.0	42.3	32.1	3.4	35.5	42.3	130.5	500.0	-11.7
7320.000	H	270.0	1.0	38.3	37.1	4.5	35.8	44.1	161.0	500.0	-9.8
8235.000	H	180.0	1.0	33.0	37.5	5.9	35.9	40.5	106.2	500.0	-13.5
9150.000	H	270.0	1.0	39.0	38.1	4.8	36.2	45.8	194.9	500.0	-8.2
1092.230	H	180.0	1.0	39.9	25.0	1.3	37.5	28.6	27.0	500.0	-25.3
2745.000	V	90.0	1.0	38.7	29.6	1.5	36.0	33.8	48.7	500.0	-20.2
3660.000	V	180.0	1.0	45.2	30.8	2.5	35.5	42.9	140.1	500.0	-11.1
4575.000	V	200.0	1.0	43.8	32.1	3.4	35.5	43.8	155.1	500.0	-10.2
7320.000	V	180.0	1.0	41.7	37.1	4.5	35.8	47.5	237.3	500.0	-6.5
8235.000	V	190.0	1.0	32.8	37.5	5.9	35.9	40.4	104.2	500.0	-13.6
9150.000	V	190.0	1.0	42.9	38.1	4.8	36.2	49.7	305.3	500.0	-4.3
1092.230	V	180.0	1.0	40.1	25.0	1.3	37.5	28.8	27.7	500.0	-25.1

Table 7: Radiated Emission Test Data- High Channel @ 927.5MHz Config. 1

Transmitting at 927.5MHz w/ 5.5dBi whip antenna Unit mounts Vertically

<1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
73.979	V	0.0	1.0	5.1	7.5	1.5	0.0	14.1	5.1	100.0	-25.9
75.900	V	0.0	1.0	3.8	7.4	1.5	0.0	12.7	4.3	100.0	-27.3
109.140	V	90.0	1.3	5.9	11.0	1.7	0.0	18.6	8.5	150.0	-24.9
117.000	V	180.0	1.0	4.4	11.6	1.7	0.0	17.7	7.7	150.0	-25.8
133.130	V	270.0	1.2	11.6	10.6	2.1	0.0	24.3	16.4	150.0	-19.2
169.124	V	0.0	1.3	7.0	10.1	2.3	0.0	19.4	9.3	150.0	-24.1
212.200	V	90.0	2.4	9.8	11.6	2.1	0.0	23.5	14.9	150.0	-20.1
242.980	V	270.0	2.2	10.4	13.1	2.9	0.0	26.4	20.9	200.0	-19.6
249.171	V	180.0	1.3	5.7	13.3	2.9	0.0	21.9	12.4	200.0	-24.1
270.600	V	180.0	1.5	8.0	14.7	3.0	0.0	25.7	19.3	200.0	-20.3
273.000	V	90.0	2.0	3.8	14.9	3.0	0.0	21.7	12.1	200.0	-24.4
420.550	V	190.0	2.0	7.9	15.9	3.8	0.0	27.6	24.1	200.0	-18.4
965.980	V	180.0	1.4	13.0	22.3	6.8	0.0	42.0	126.1	500.0	-12.0
73.979	H	270.0	2.6	7.7	7.5	1.5	0.0	16.7	6.8	100.0	-23.3
108.335	H	180.0	2.5	5.6	10.9	1.7	0.0	18.2	8.1	150.0	-25.3
117.000	H	0.0	3.3	1.2	11.6	1.7	0.0	14.5	5.3	150.0	-29.0
133.130	H	270.0	3.0	3.7	10.6	2.1	0.0	16.4	6.6	150.0	-27.1
169.124	H	270.0	3.0	3.8	10.1	2.3	0.0	16.2	6.5	150.0	-27.3
242.980	H	0.0	1.7	4.9	13.1	2.9	0.0	20.9	11.1	200.0	-25.1
420.550	H	180.0	2.6	4.2	15.9	3.8	0.0	23.9	15.8	200.0	-22.1
965.980	H	0.0	1.5	8.4	22.3	6.8	0.0	37.5	74.7	500.0	-16.5

>1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
Peak											
2781.000	V	150.0	1.0	48.0	29.6	1.5	36.0	43.2	144.0	5000.0	-30.8
3708.000	V	160.0	1.0	47.8	30.8	2.6	35.5	45.7	193.3	5000.0	-28.3
4635.000	V	180.0	1.0	47.2	32.2	3.4	35.5	47.3	232.0	5000.0	-26.7
7416.000	V	250.0	1.0	47.0	37.1	4.8	35.8	53.1	453.1	5000.0	-20.9
8343.000	V	180.0	1.0	42.7	37.5	5.8	35.9	50.1	318.9	5000.0	-23.9
1093.000	V	0.0	1.0	48.1	25.0	1.3	37.5	36.8	69.5	5000.0	-37.1
2781.000	H	150.0	1.0	46.5	29.6	1.5	36.0	41.7	121.2	5000.0	-32.3
3708.000	H	180.0	1.0	46.2	30.8	2.6	35.5	44.1	159.7	5000.0	-29.9
4635.000	H	160.0	1.0	46.2	32.2	3.4	35.5	46.3	206.1	5000.0	-27.7
7416.000	H	225.0	1.0	48.0	37.1	4.8	35.8	54.1	508.4	5000.0	-19.9
8343.000	H	180.0	1.0	43.3	37.5	5.8	35.9	50.7	344.0	5000.0	-23.2
1093.000	H	0.0	1.0	47.7	25.0	1.3	37.5	36.4	66.2	5000.0	-37.6

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
Average											
2781.000	V	150.0	1.0	40.7	29.6	1.5	36.0	35.8	61.9	500.0	-18.1
3708.000	V	160.0	1.0	41.7	30.8	2.6	35.5	39.6	95.1	500.0	-14.4
4635.000	V	180.0	1.0	42.2	32.2	3.4	35.5	42.3	130.0	500.0	-11.7
7416.000	V	250.0	1.0	38.5	37.1	4.8	35.8	44.6	170.3	500.0	-9.4
8343.000	V	180.0	1.0	31.5	37.5	5.8	35.9	38.9	88.1	500.0	-15.1
1093.000	V	0.0	1.0	38.1	25.0	1.3	37.5	26.8	22.0	500.0	-27.1
2781.000	H	150.0	1.0	37.2	29.6	1.5	36.0	32.4	41.5	500.0	-21.6
3708.000	H	180.0	1.0	39.2	30.8	2.6	35.5	37.1	71.6	500.0	-16.9
4635.000	H	160.0	1.0	37.0	32.2	3.4	35.5	37.1	71.7	500.0	-16.9
7416.000	H	225.0	1.0	39.7	37.1	4.8	35.8	45.8	194.8	500.0	-8.2
8343.000	H	180.0	1.0	31.5	37.5	5.8	35.9	38.9	88.1	500.0	-15.1
1093.000	H	0.0	1.0	37.7	25.0	1.3	37.5	26.4	20.9	500.0	-27.6

Table 8: Radiated Emission Test Data- Low Channel @ 902.5MHz Config. 2
(Restricted Bands)

Transmitting at 902.5MHz w/ 5.5dBi whip antenna **Unit mounts Vertically**
<1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
75.120	V	180.0	1.2	21.6	7.4	1.5	0.0	30.5	33.6	100.0	-9.5
110.820	V	190.0	1.3	12.8	11.2	1.7	0.0	25.7	19.2	150.0	-17.9
119.825	V	180.0	1.3	16.4	11.8	1.7	0.0	29.9	31.2	150.0	-13.6
125.000	V	270.0	1.3	13.2	11.4	2.1	0.0	26.7	21.6	150.0	-16.8
150.000	V	90.0	1.3	26.8	9.1	2.1	0.0	38.0	79.4	150.0	-5.5
162.980	V	270.0	1.4	14.5	10.1	2.3	0.0	26.9	22.1	150.0	-16.6
244.200	V	170.0	1.6	11.8	13.1	2.9	0.0	27.8	24.6	200.0	-18.2
275.000	V	180.0	1.6	8.9	15.0	3.0	0.0	26.9	22.1	200.0	-19.1
325.000	V	90.0	1.4	10.1	14.5	3.2	0.0	27.8	24.6	200.0	-18.2
400.000	V	180.0	1.4	16.1	15.7	3.8	0.0	35.6	60.3	200.0	-10.4
980.440	V	180.0	1.5	19.2	22.4	6.8	0.0	48.4	262.0	500.0	-5.6
75.120	H	0.0	2.5	18.5	7.4	1.5	0.0	27.4	23.5	100.0	-12.6
110.820	H	180.0	3.0	13.5	11.2	1.7	0.0	26.4	20.8	150.0	-17.2
119.825	H	180.0	3.0	13.2	11.8	1.7	0.0	26.7	21.6	150.0	-16.8
125.000	H	180.0	3.5	18.3	11.4	2.1	0.0	31.8	38.9	150.0	-11.7
150.000	H	180.0	1.8	28.0	9.1	2.1	0.0	39.2	91.2	150.0	-4.3
275.000	H	270.0	3.3	7.6	15.0	3.0	0.0	25.6	19.1	200.0	-20.4
325.000	H	170.0	1.7	9.4	14.5	3.2	0.0	27.1	22.6	200.0	-18.9
400.000	H	90.0	1.9	12.5	15.7	3.8	0.0	32.0	39.8	200.0	-14.0
980.440	H	270.0	2.0	16.2	22.4	6.8	0.0	45.4	185.5	500.0	-8.6

>1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
Peak											
1094.600	V	0.0	1.0	57.8	25.0	1.3	37.5	46.6	213.1	5000.0	-27.4
1695.330	V	180.0	1.0	47.8	27.2	1.5	36.8	39.7	96.7	5000.0	-34.3
2707.500	V	270.0	1.0	52.0	29.5	1.5	36.0	47.0	223.9	5000.0	-27.0
3610.000	V	290.0	1.0	51.2	30.7	2.5	35.6	48.8	274.8	5000.0	-25.2
4512.500	V	180.0	1.0	42.7	32.0	3.3	35.5	42.5	133.7	5000.0	-31.5
5415.000	V	180.0	1.0	46.7	33.5	3.8	35.6	48.4	261.9	5000.0	-25.6
8122.500	V	190.0	1.0	42.5	37.4	6.1	35.8	50.2	322.0	5000.0	-23.8
9025.000	V	180.0	1.0	44.8	38.0	4.8	36.1	51.5	377.2	5000.0	-22.4
1094.600	H	180.0	1.0	54.6	25.0	1.3	37.5	43.4	147.1	5000.0	-30.6
1695.330	H	180.0	1.0	48.7	27.2	1.5	36.8	40.6	106.9	5000.0	-33.4
2707.500	H	190.0	1.0	47.8	29.5	1.5	36.0	42.8	138.5	5000.0	-31.1

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
3610.000	H	200.0	1.0	54.2	30.7	2.5	35.6	51.8	388.2	5000.0	-22.2
4512.500	H	170.0	1.0	42.5	32.0	3.3	35.5	42.4	131.1	5000.0	-31.6
5415.000	H	190.0	1.0	51.8	33.5	3.8	35.6	53.5	474.5	5000.0	-20.5
8122.500	H	180.0	1.0	42.8	37.4	6.1	35.8	50.5	334.4	5000.0	-23.5
9025.000	H	180.0	1.0	47.0	38.0	4.8	36.1	53.7	484.3	5000.0	-20.3
Average											
1094.600	V	0.0	1.0	47.0	25.0	1.3	37.5	35.8	61.3	500.0	-18.2
1695.330	V	180.0	1.0	34.8	27.2	1.5	36.8	26.7	21.6	500.0	-27.3
2707.500	V	270.0	1.0	49.3	29.5	1.5	36.0	44.3	164.6	500.0	-9.6
3610.000	V	290.0	1.0	48.3	30.7	2.5	35.6	45.9	198.2	500.0	-8.0
4512.500	V	180.0	1.0	33.2	32.0	3.3	35.5	33.0	44.8	500.0	-21.0
5415.000	V	180.0	1.0	40.7	33.5	3.8	35.6	42.4	131.3	500.0	-11.6
8122.500	V	190.0	1.0	32.0	37.4	6.1	35.8	39.7	96.1	500.0	-14.3
9025.000	V	180.0	1.0	36.1	38.0	4.8	36.1	42.8	138.1	500.0	-11.2
1094.600	H	180.0	1.0	43.0	25.0	1.3	37.5	31.8	38.7	500.0	-22.2
1695.330	H	180.0	1.0	33.9	27.2	1.5	36.8	25.8	19.5	500.0	-28.2
2707.500	H	190.0	1.0	42.7	29.5	1.5	36.0	37.7	76.5	500.0	-16.3
3610.000	H	200.0	1.0	52.2	30.7	2.5	35.6	49.8	308.3	500.0	-4.2
4512.500	H	170.0	1.0	31.7	32.0	3.3	35.5	31.6	37.8	500.0	-22.4
5415.000	H	190.0	1.0	46.7	33.5	3.8	35.6	48.4	261.9	500.0	-5.6
8122.500	H	180.0	1.0	32.0	37.4	6.1	35.8	39.7	96.1	500.0	-14.3
9025.000	H	180.0	1.0	36.2	38.0	4.8	36.1	42.9	139.7	500.0	-11.1

Table 9: Radiated Emission Test Data- Low Channel @ 915MHz Config. 2
(Restricted Bands)

Transmitting at 915MHz w/ 5.5dBi whip antenna Unit mounts Vertically

<1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
75.120	V	180.0	1.2	21.6	7.4	1.5	0.0	30.5	33.6	100.0	-9.5
110.820	V	190.0	1.3	12.8	11.2	1.7	0.0	25.7	19.2	150.0	-17.9
119.825	V	180.0	1.3	16.4	11.8	1.7	0.0	29.9	31.2	150.0	-13.6
125.000	V	270.0	1.3	13.2	11.4	2.1	0.0	26.7	21.6	150.0	-16.8
150.000	V	90.0	1.3	26.8	9.1	2.1	0.0	38.0	79.4	150.0	-5.5
162.980	V	270.0	1.4	14.5	10.1	2.3	0.0	26.9	22.1	150.0	-16.6
244.200	V	170.0	1.6	11.8	13.1	2.9	0.0	27.8	24.6	200.0	-18.2
275.000	V	180.0	1.6	8.9	15.0	3.0	0.0	26.9	22.1	200.0	-19.1
325.000	V	90.0	1.4	10.1	14.5	3.2	0.0	27.8	24.6	200.0	-18.2
400.000	V	180.0	1.4	16.1	15.7	3.8	0.0	35.6	60.3	200.0	-10.4
992.940	V	90.0	2.5	17.3	22.5	6.8	0.0	46.6	214.2	500.0	-7.4
75.120	H	0.0	2.5	18.5	7.4	1.5	0.0	27.4	23.5	100.0	-12.6
110.820	H	180.0	3.0	13.5	11.2	1.7	0.0	26.4	20.8	150.0	-17.2
119.825	H	180.0	3.0	13.2	11.8	1.7	0.0	26.7	21.6	150.0	-16.8
125.000	H	180.0	3.5	18.3	11.4	2.1	0.0	31.8	38.9	150.0	-11.7
150.000	H	180.0	1.8	28.0	9.1	2.1	0.0	39.2	91.2	150.0	-4.3
275.000	H	270.0	3.3	7.6	15.0	3.0	0.0	25.6	19.1	200.0	-20.4
325.000	H	170.0	1.7	9.4	14.5	3.2	0.0	27.1	22.6	200.0	-18.9
400.000	H	90.0	1.9	12.5	15.7	3.8	0.0	32.0	39.8	200.0	-14.0
992.940	H	2.3	0.0	12.3	22.5	6.8	0.0	41.6	120.5	500.0	-12.4

>1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
Peak											
1092.230	V	180.0	1.0	53.0	25.0	1.3	37.5	41.7	122.1	5000.0	-32.2
1676.055	V	180.0	1.0	47.5	27.1	1.5	36.8	39.3	92.5	5000.0	-34.7
2745.000	V	200.0	1.0	46.7	29.6	1.5	36.0	41.8	122.4	5000.0	-32.2
3660.000	V	270.0	1.0	50.2	30.8	2.5	35.5	47.9	249.1	5000.0	-26.1
4575.000	V	180.0	1.0	43.7	32.1	3.4	35.5	43.7	152.3	5000.0	-30.3
7320.000	V	180.0	1.0	44.2	37.1	4.5	35.8	50.0	316.4	5000.0	-24.0
8235.000	V	200.0	1.0	43.0	37.5	5.9	35.9	50.5	336.0	5000.0	-23.5
9150.000	V	180.0	1.0	45.0	38.1	4.8	36.2	51.8	388.9	5000.0	-22.2
1092.230	H	0.0	1.0	53.8	25.0	1.3	37.5	42.6	134.4	5000.0	-31.4
1676.055	H	0.0	1.0	47.0	27.1	1.5	36.8	38.8	87.4	5000.0	-35.2
2745.000	H	180.0	1.0	48.8	29.6	1.5	36.0	43.9	157.0	5000.0	-30.1

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
3660.000	H	190.0	1.0	52.5	30.8	2.5	35.5	50.3	325.7	5000.0	-23.7
4575.000	H	180.0	1.0	43.5	32.1	3.4	35.5	43.5	149.4	5000.0	-30.5
7320.000	H	180.0	1.0	46.7	37.1	4.5	35.8	52.5	421.9	5000.0	-21.5
8235.000	H	180.0	1.0	43.5	37.5	5.9	35.9	51.0	355.9	5000.0	-23.0
9150.000	H	190.0	1.0	49.3	38.1	4.8	36.2	56.1	640.2	5000.0	-17.9
Average											
1092.230	V	180.0	1.0	43.8	25.0	1.3	37.5	32.5	42.3	500.0	-21.4
1676.055	V	180.0	1.0	35.8	27.1	1.5	36.8	27.7	24.1	500.0	-26.3
2745.000	V	200.0	1.0	39.2	29.6	1.5	36.0	34.3	51.6	500.0	-19.7
3660.000	V	270.0	1.0	46.0	30.8	2.5	35.5	43.8	154.1	500.0	-10.2
4575.000	V	180.0	1.0	36.5	32.1	3.4	35.5	36.5	66.7	500.0	-17.5
7320.000	V	180.0	1.0	34.8	37.1	4.5	35.8	40.7	108.0	500.0	-13.3
8235.000	V	200.0	1.0	32.0	37.5	5.9	35.9	39.5	94.7	500.0	-14.5
9150.000	V	180.0	1.0	35.1	38.1	4.8	36.2	41.9	124.4	500.0	-12.1
1092.230	H	0.0	1.0	39.7	25.0	1.3	37.5	28.4	26.3	500.0	-25.6
1676.055	H	0.0	1.0	35.3	27.1	1.5	36.8	27.2	22.8	500.0	-26.8
2745.000	H	180.0	1.0	43.3	29.6	1.5	36.0	38.4	83.3	500.0	-15.6
3660.000	H	190.0	1.0	49.8	30.8	2.5	35.5	47.6	239.5	500.0	-6.4
4575.000	H	180.0	1.0	34.7	32.1	3.4	35.5	34.7	54.0	500.0	-19.3
7320.000	H	180.0	1.0	40.3	37.1	4.5	35.8	46.2	203.4	500.0	-7.8
8235.000	H	180.0	1.0	32.1	37.5	5.9	35.9	39.6	95.8	500.0	-14.4
9150.000	H	190.0	1.0	40.5	38.1	4.8	36.2	47.3	231.6	500.0	-6.7

Table 10: Radiated Emission Test Data- Low Channel @ 927MHz Config. 2
(Restricted Bands)

Transmitting at 927MHz w/ 5.5dBi whip antenna Unit mounts Vertically

<1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
75.120	V	180.0	1.2	21.6	7.4	1.5	0.0	30.5	33.6	100.0	-9.5
110.820	V	190.0	1.3	12.8	11.2	1.7	0.0	25.7	19.2	150.0	-17.9
119.825	V	180.0	1.3	16.4	11.8	1.7	0.0	29.9	31.2	150.0	-13.6
125.000	V	270.0	1.3	13.2	11.4	2.1	0.0	26.7	21.6	150.0	-16.8
150.000	V	90.0	1.3	26.8	9.1	2.1	0.0	38.0	79.4	150.0	-5.5
162.980	V	270.0	1.4	14.5	10.1	2.3	0.0	26.9	22.1	150.0	-16.6
244.200	V	170.0	1.6	11.8	13.1	2.9	0.0	27.8	24.6	200.0	-18.2
275.000	V	180.0	1.6	8.9	15.0	3.0	0.0	26.9	22.1	200.0	-19.1
325.000	V	90.0	1.4	10.1	14.5	3.2	0.0	27.8	24.6	200.0	-18.2
400.000	V	180.0	1.4	16.1	15.7	3.8	0.0	35.6	60.3	200.0	-10.4
966.016	V	180.0	1.5	18.3	22.3	6.8	0.0	47.4	233.5	500.0	-6.6
75.120	H	0.0	2.5	18.5	7.4	1.5	0.0	27.4	23.5	100.0	-12.6
110.820	H	180.0	3.0	13.5	11.2	1.7	0.0	26.4	20.8	150.0	-17.2
119.825	H	180.0	3.0	13.2	11.8	1.7	0.0	26.7	21.6	150.0	-16.8
125.000	H	180.0	3.5	18.3	11.4	2.1	0.0	31.8	38.9	150.0	-11.7
150.000	H	180.0	1.8	28.0	9.1	2.1	0.0	39.2	91.2	150.0	-4.3
275.000	H	270.0	3.3	7.6	15.0	3.0	0.0	25.6	19.1	200.0	-20.4
325.000	H	170.0	1.7	9.4	14.5	3.2	0.0	27.1	22.6	200.0	-18.9
400.000	H	90.0	1.9	12.5	15.7	3.8	0.0	32.0	39.8	200.0	-14.0
993.028	H	180.0	1.4	13.9	22.5	6.8	0.0	43.2	144.8	500.0	-10.8

>1000MHz

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
Peak											
2781.000	V	200.0	1.0	46.3	29.6	1.5	36.0	41.5	118.4	5000.0	-32.5
3708.000	V	180.0	1.0	50.3	30.8	2.6	35.5	48.2	257.8	5000.0	-25.8
4635.000	V	170.0	1.0	44.8	32.2	3.4	35.5	44.9	176.6	5000.0	-29.0
7416.000	V	180.0	1.0	46.7	37.1	4.8	35.8	52.8	436.2	5000.0	-21.2
8343.000	V	90.0	1.0	42.8	37.5	5.8	35.9	50.2	324.8	5000.0	-23.7
1093.000	V	10.0	1.0	52.3	25.0	1.3	37.5	41.1	113.1	5000.0	-32.9
2781.000	H	180.0	1.0	47.7	29.6	1.5	36.0	42.9	139.1	5000.0	-31.1
3708.000	H	180.0	1.0	51.8	30.8	2.6	35.5	49.7	306.4	5000.0	-24.3
4635.000	H	170.0	1.0	44.5	32.2	3.4	35.5	44.6	170.0	5000.0	-29.4
7416.000	H	180.0	1.0	46.5	37.1	4.8	35.8	52.6	427.7	5000.0	-21.4
8343.000	H	180.0	1.0	42.7	37.5	5.8	35.9	50.1	318.9	5000.0	-23.9

Frequency (MHz)	Pol. H/V	Azimuth Degree	Ant. Height (m)	SA Level (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)
1093.000	H	200.0	1.0	51.2	25.0	1.3	37.5	39.9	99.3	5000.0	-34.0
Average											
2781.000	V	200.0	1.0	39.0	29.6	1.5	36.0	34.2	51.1	500.0	-19.8
3708.000	V	180.0	1.0	46.7	30.8	2.6	35.5	44.6	169.1	500.0	-9.4
4635.000	V	170.0	1.0	34.0	32.2	3.4	35.5	34.1	50.8	500.0	-19.9
7416.000	V	180.0	1.0	36.5	37.1	4.8	35.8	42.6	135.3	500.0	-11.4
8343.000	V	90.0	1.0	31.5	37.5	5.8	35.9	38.9	88.1	500.0	-15.1
1093.000	V	10.0	1.0	42.8	25.0	1.3	37.5	31.6	37.9	500.0	-22.4
2781.000	H	180.0	1.0	41.2	29.6	1.5	36.0	36.3	65.6	500.0	-17.6
3708.000	H	180.0	1.0	42.5	30.8	2.6	35.5	40.4	104.6	500.0	-13.6
4635.000	H	170.0	1.0	34.2	32.2	3.4	35.5	34.3	51.8	500.0	-19.7
7416.000	H	180.0	1.0	35.3	37.1	4.8	35.8	41.4	117.8	500.0	-12.6
8343.000	H	180.0	1.0	31.7	37.5	5.8	35.9	39.1	90.2	500.0	-14.9
1093.000	H	200.0	1.0	41.3	25.0	1.3	37.5	30.1	31.9	500.0	-23.9

4.7 Conducted Emissions

4.7.1 Requirements

Test Arrangement: Table Top

Compliance Standard: FCC Part 15.207

Compliance Limits		
Frequency	Quasi-peak	Average
0.15-0.5MHz	66 to 56dB μ V	56 to 46dB μ V
0.5 to 5MHz	56dB μ V	46dB μ V
0.5-30MHz	60dB μ V	50dB μ V

4.7.2 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 μ H 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. Power was supplied to the peripherals through a second LISN. The peripherals were placed on the table in accordance with ANSI C63.4-2001. 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.

4.7.3 Test Data

Table 11 and 12 provide the test results for phase and neutral line power line conducted emissions. Tests were performed at 120VAC and 230VAC.

Table 11: Conducted Emission Test Data Configuration 1

LINE 1 – NEUTRAL 120 VAC

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)
0.170	8.6	10.1	0.3	65.0	19.1	-45.9	-1.0	10.1	9.5	55.0	-45.5
0.262	12.5	10.2	0.2	61.4	22.9	-38.5	6.8	10.2	17.2	51.4	-34.2
0.339	7.0	10.2	0.2	59.2	17.4	-41.8	-2.4	10.2	8.0	49.2	-41.2
0.790	8.0	10.4	0.2	56.0	18.6	-37.4	0.9	10.4	11.5	46.0	-34.5
0.962	7.8	10.5	0.2	56.0	18.5	-37.5	-1.3	10.5	9.4	46.0	-36.6
28.170	13.0	12.7	6.0	60.0	31.7	-28.3	1.9	12.7	20.6	50.0	-29.4

LINE 2 – Phase 120 VAC

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)
0.170	9.9	10.1	0.7	65.0	20.7	-44.2	1.2	10.1	12.0	55.0	-42.9
0.262	13.1	10.2	0.4	61.4	23.7	-37.7	7.1	10.2	17.7	51.4	-33.7
0.339	8.0	10.2	0.3	59.2	18.6	-40.7	1.4	10.2	12.0	49.2	-37.3
0.790	7.6	10.4	0.2	56.0	18.3	-37.7	0.4	10.4	11.1	46.0	-34.9
0.962	6.7	10.5	0.2	56.0	17.4	-38.6	-1.4	10.5	9.3	46.0	-36.7
28.170	10.0	12.7	5.0	60.0	27.7	-32.3	1.5	12.7	19.2	50.0	-30.8

LINE 1 – NEUTRAL 230VAC

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)
0.170	13.7	10.1	0.3	65.0	24.2	-40.8	0.2	10.1	10.7	55.0	-44.3
0.263	14.2	10.2	0.2	61.3	24.6	-36.7	6.6	10.2	17.0	51.3	-34.3
0.339	7.5	10.2	0.2	59.2	17.9	-41.3	-2.2	10.2	8.2	49.2	-41.0
0.790	7.8	10.4	0.2	56.0	18.4	-37.6	-3.0	10.4	7.6	46.0	-38.4
0.962	7.1	10.5	0.2	56.0	17.8	-38.2	-2.1	10.5	8.6	46.0	-37.4
27.650	10.8	12.7	5.9	60.0	29.4	-30.6	1.6	12.7	20.2	50.0	-29.8

LINE 2 – PHASE 230VAC

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)
0.170	10.2	10.1	0.7	65.0	21.0	-43.9	0.2	10.1	11.0	55.0	-43.9
0.263	14.0	10.2	0.4	61.3	24.6	-36.7	6.6	10.2	17.2	51.3	-34.1
0.339	7.3	10.2	0.3	59.2	17.9	-41.4	-3.1	10.2	7.5	49.2	-41.8
0.790	8.9	10.4	0.2	56.0	19.6	-36.4	-1.0	10.4	9.7	46.0	-36.3
0.962	6.8	10.5	0.2	56.0	17.5	-38.5	-3.0	10.5	7.7	46.0	-38.3
27.650	12.2	12.7	4.9	60.0	29.8	-30.2	2.2	12.7	19.8	50.0	-30.2

Table 12: Conducted Emission Test Data Configuration 2

Used Power supply AC/DC -Linksys AM-12500 ser # CY006021 to supply power to LAN Power injector

LINE 1 – NEUTRAL 120 VAC

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)
0.150	40.0	10.1	0.4	66.0	50.5	-15.5	3.3	10.1	13.8	56.0	-42.2
0.264	37.6	10.2	0.2	61.3	48.0	-13.3	8.2	10.2	18.6	51.3	-32.7
1.600	15.2	10.5	0.4	56.0	26.1	-29.9	8.4	10.5	19.3	46.0	-26.7
12.746	24.4	11.9	2.4	60.0	38.7	-21.3	19.5	11.9	33.8	50.0	-16.2
17.693	22.3	12.2	3.6	60.0	38.2	-21.8	18.5	12.2	34.4	50.0	-15.6
23.120	24.6	12.5	4.9	60.0	42.0	-18.0	21.4	12.5	38.8	50.0	-11.2
26.608	24.8	12.7	5.6	60.0	43.1	-16.9	21.9	12.7	40.2	50.0	-9.8
28.680	24.5	12.8	6.1	60.0	43.3	-16.7	21.3	12.8	40.1	50.0	-9.9

LINE 2 – Phase 120 VAC

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)
0.150	40.3	10.1	0.8	66.0	51.2	-14.8	2.5	10.1	13.4	56.0	-42.6
0.264	38.5	10.2	0.4	61.3	49.1	-12.2	5.3	10.2	15.9	51.3	-35.4
1.600	16.3	10.5	0.3	56.0	27.1	-28.9	8.7	10.5	19.5	46.0	-26.5
12.746	25.6	11.9	1.8	60.0	39.3	-20.7	21.0	11.9	34.7	50.0	-15.3
17.693	25.9	12.2	2.7	60.0	40.9	-19.1	20.3	12.2	35.3	50.0	-14.7
23.120	23.1	12.5	3.9	60.0	39.5	-20.5	20.7	12.5	37.1	50.0	-12.9
26.608	27.1	12.7	4.6	60.0	44.4	-15.6	24.2	12.7	41.5	50.0	-8.5
28.680	28.5	12.8	5.1	60.0	46.3	-13.7	25.9	12.8	43.7	50.0	-6.3