



## FCC PART 87 TEST AND MEASUREMENT REPORT

For

**Selex Sistemi Integrati Inc.**

11300 West 89<sup>th</sup> Street, Overland Park, Kansas 66214, USA

**FCC ID: JPAVOR2**

<b>Report Type:</b> Original Report	<b>Product Type:</b> VOR Transmitter
<b>Test Engineer:</b> <u>Jack Liu</u> 	
<b>Report Number:</b> <u>R0902091</u>	
<b>Report Date:</b> <u>2009-04-14</u>	
Boni Baniquid 	
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\* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk “\*” (Rev. 2)

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### DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R0902091	Original Report	2009-04-14

## 1 GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test (EUT)

This Bay Area Compliance Laboratories Corp. test report has been prepared on behalf of *Selex Sistemi Integrati Inc* and their product, model: *1150A VOR*, FCC ID: *JPAVOR2* or the EUT (Equipment Under Test) as referred to in the rest of this report. The EUT is a Single or Dual Doppler VHF Omni-range (DVOR) Station.

### 1.2 Mechanical Description of EUT

Frequency Range: TX: 108 to 118MHz  
Type of Emission: 21K0A9W  
Power Supply: 85 to 264VAC, 47 to 63Hz, single phase  
Dimensions: 183 (H) X 61 (W) X 61 (D) cm  
Weight: 205 Kg

\* The test data gathered are from typical production sample, model: 1150A VOR. Sample ID: 72271 serial number: B2103 assigned by the BACL.

### 1.3 EUT Photo



Additional photos in Exhibit C

## 1.4 Objective

This type approval report is prepared on behalf of *Selex Sistemi Integrati Inc.* in accordance with Part 2, Subpart J and Part 87 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, field strength of spurious radiation, frequency stability, and conducted and radiated margin.

This report is provided on behalf of *Selex Sistemi Integrati Inc.* for confirmation of regulatory compliance. The manufacturer declares that the *model: 1150A VOR Sample ID: 72271, serial number: B2103* provided for testing is identical in construction and electrical operation with the post production product. Retesting is recommended for any changes to the model that might affect compliance including those with respect to software, circuitries, PCB layout, RF module, features and functionality.

## 1.5 Related Submittal(s)/Grant(s)

No Related Submittals

## 1.6 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 87 – Aviation Services

Applicable Standards: TIA-603-C, ANSI C63.4-2003.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## 1.7 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from  $\pm 2.0$  for Conducted Emissions tests and  $\pm 4.0$  dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

## 1.8 Test Facility

The test site used by Bay Area Compliance Laboratories Corp. to collect radiated and conducted emission measurement data is located at their facility in Sunnyvale, California 94089, USA.

The test site at Bay Area Compliance Laboratories Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of

the FCC Rules and Article 8 of the VCCI regulations. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference have the reports on file and are listed under FCC file 31040/SIT 1300F2, IC registration number: 3062A, and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

## **2 SYSTEM TEST CONFIGURATION**

### **2.1 Justification**

The EUT was configured for testing according to TIA-603-C.

The final qualification test was performed with test software provided by the manufacturer.

### **2.2 Equipment Modifications**

No modifications were made to the EUT.

### **2.3 Local Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
Red Bank, N.J.	Hi Power Attenuator	Ax-2000-30	375311

### **2.4 Interface Ports and Cabling**

Cable Description	Length (m)	From	To
BNC Cable	1.84	RF Communication Test Set	EUT

### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§2.1046, §87.131, §87.137	Output Power and Emission	Compliant
§2.1049, §87.135(a), §87.137	Bandwidth of Emissions 99%Occupied Bandwidth,	Compliant
§2.1051; §87.139	Emission Limitation Spurious Emission at Antenna & Emission Mask	Compliant
§2.1053, §87.139	Field Strength of Spurious Emission	Compliant
§2.1047, §87.141	Modulation Characteristics	Compliant
§2.1055, §87.133	Frequency Stability	Compliant
§1.1310, §2.1091	RF Exposure	Compliant
§87.151	Special Requirements for Automatic Link Establishment (ALE)	N/A
§87.151	Special Requirements for differential GPS Receiver	N/A

## 4 §2.1046, §87.131 & §87.137– OUTPUT POWER AND EMISSIONS

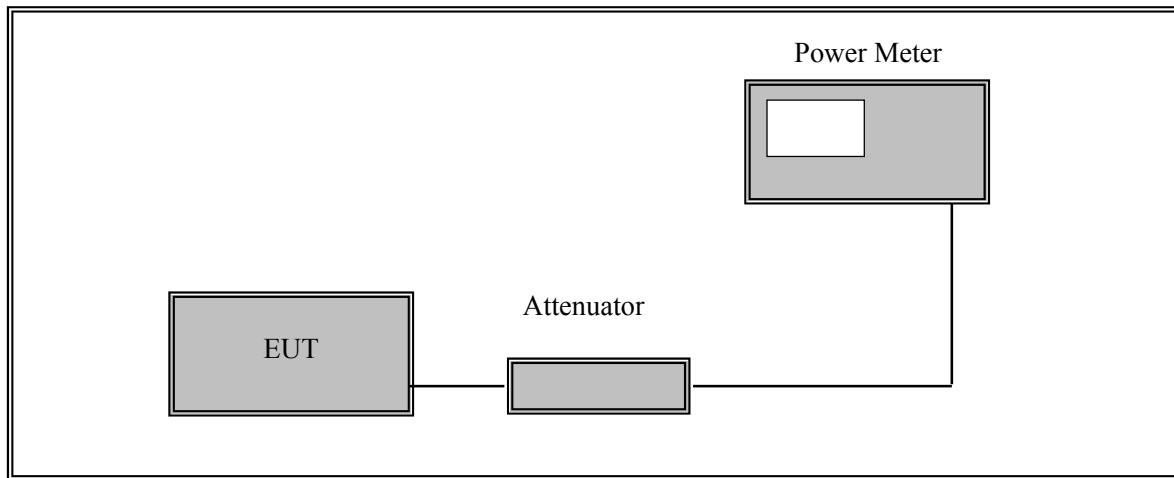
### 4.1 Applicable Standard

§2.1046 and §87.131, §87.137

### 4.2 Test Procedure

The Transmitter (EUT) was connected to a resistive load coaxial attenuator of normal load impedance and modulated output power was measured by means of on Spectrum Analyzer.

### 4.3 Test Setup Block Diagram



### 4.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Due Date
Agilent	Power Meter	E4419B	MY41291511	2009-10-09

*\* Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

### 4.5 Environmental Conditions

Temperature:	16 °C
Relative Humidity:	45 %
ATM Pressure:	101.5kPa

*\* Testing performed by Jack Liu on 2009-02-18 in the RF test site.*

#### 4.6 Test Results

Frequency (MHz)	Rated Power Level (Watt)	Final Voltage (Vdc)	Final Current (A)	Measured TX Output Power	
				(dBm)	(Watts)
108.00	100	51.7	4.7	49.89	97.50
113.00	100	51.9	4.1	49.76	94.62
117.95	100	52.2	6.0	49.09	81.10

## 5 §2.1049, §87.135(a) & §87.137 – BANDWIDTH EMISSIONS

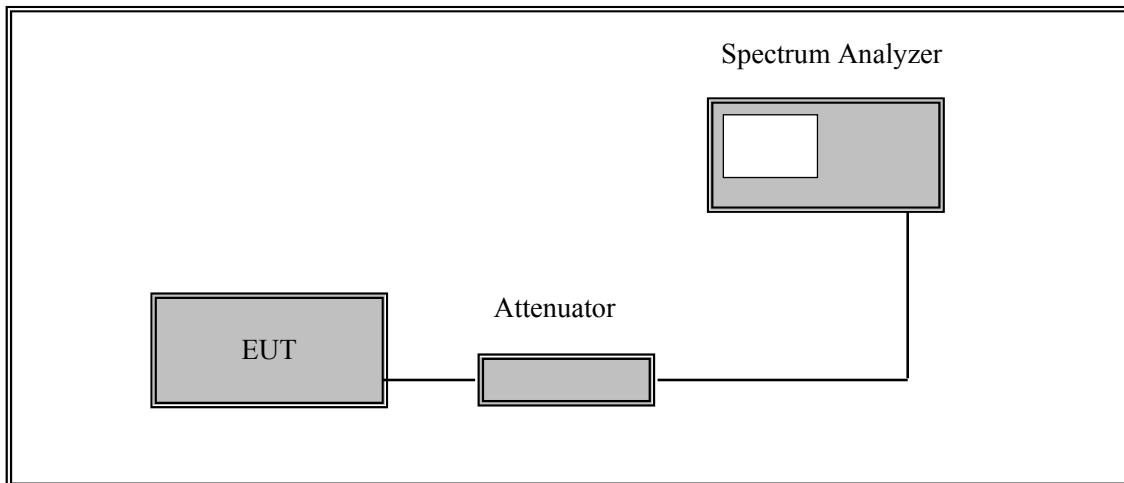
### 5.1 Applicable Standards

§ 2.1049, §87.135(a) and §87.137.

### 5.2 Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation. The EUT is modulated in J3E mode with 400Hz and 1800 Hz tones with a level 10dB greater than that of necessary to produce rated peak envelope power.

### 5.3 Test Setup Block Diagram



### 5.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Due Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-05-31

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

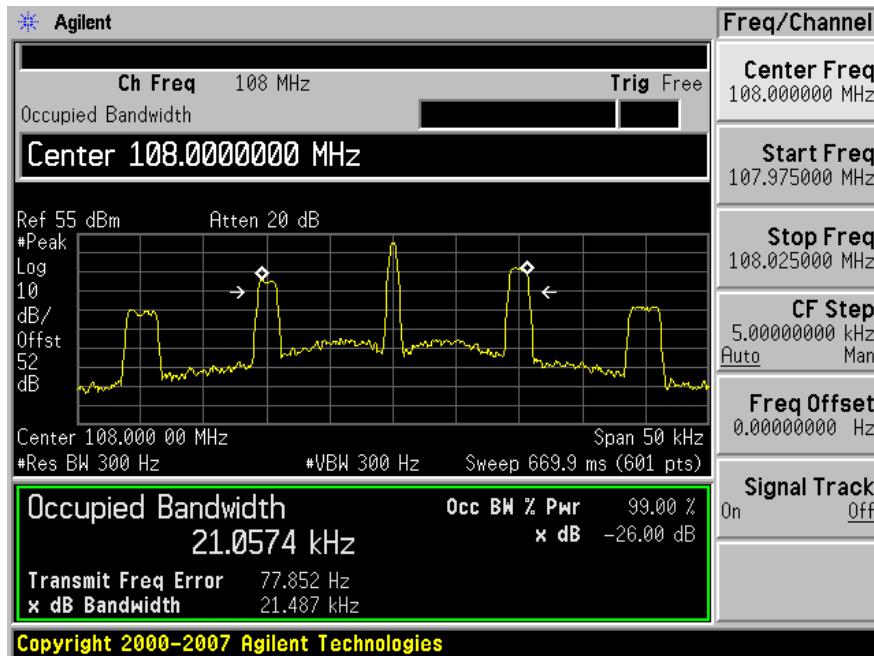
### 5.5 Environmental Conditions

Temperature:	16 °C
Relative Humidity:	45 %
ATM Pressure:	101.5kPa

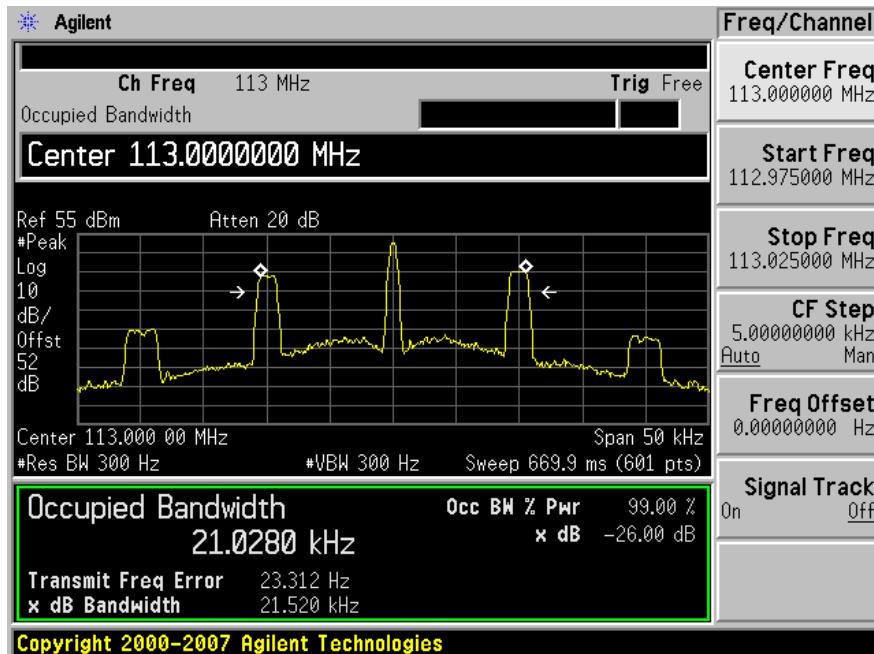
\* Testing performed by Jack Liu on 2009-02-18 in RF test site.

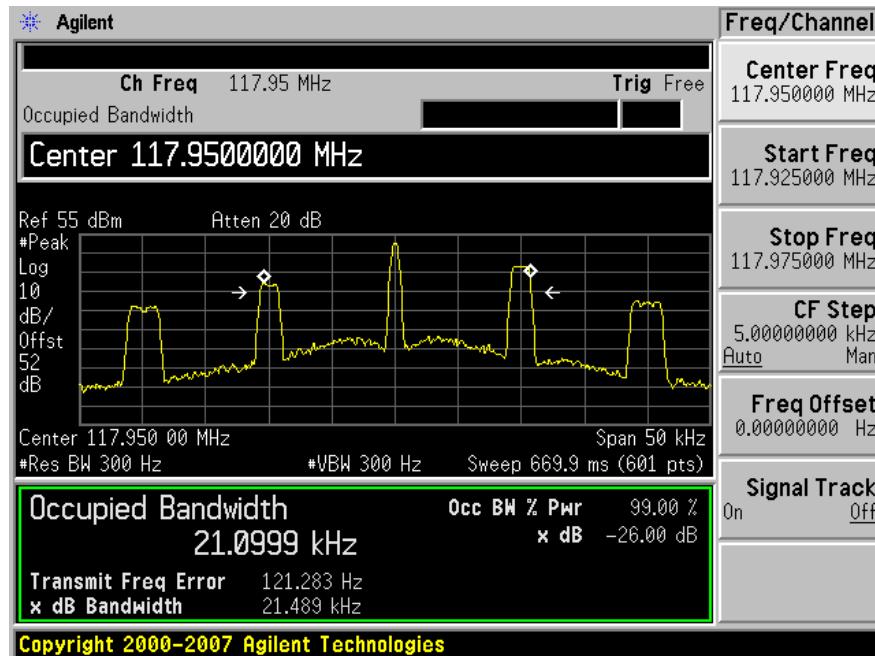
## 5.6 Test Results

**Plot 1: Low Channel @ 108 MHz (9960Hz Modulation)**



**Plot 2: Middle Channel @ 113 MHz (9960Hz Modulation)**



**Plot 3: High Channel @ 117.95 MHz (9960Hz Modulation)**

## **6 §2.1051 & §87.139 – UNWANTED EMISSIONS & EMISSION MASK**

### **6.1 Applicable Standards**

§ 2.1051 and §87.139

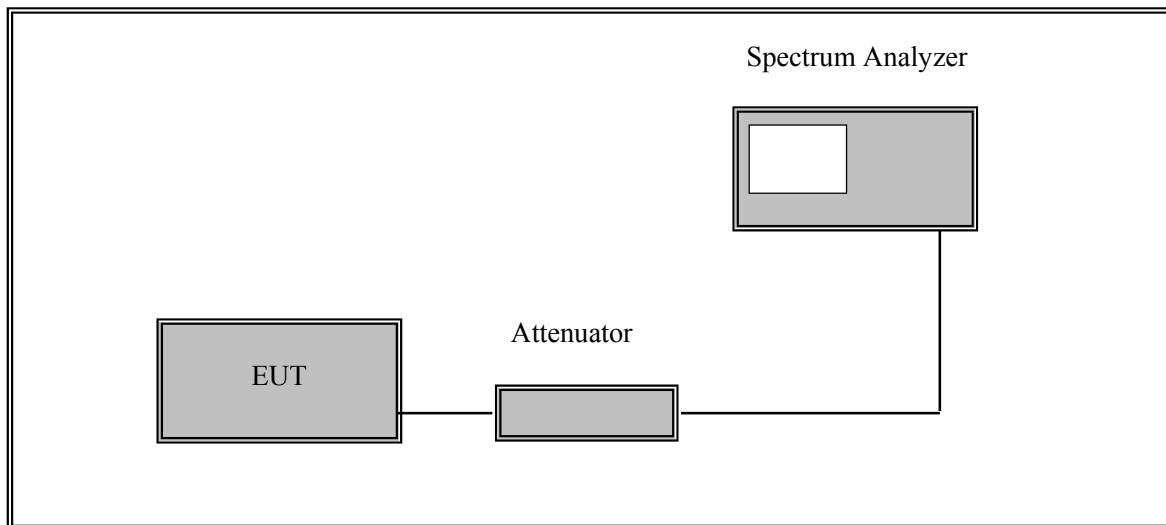
### **6.2 Test Procedure**

*Conducted:*

TIA 603-C Clause 2.2.13

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation.

### **6.3 Test Setup Block Diagram**



### **6.4 Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Due Date
HP	RF Communication Test Set	8920A	3438A05338	2010-03-20
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-05-31

*\* Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

## 6.5 Environmental Conditions

<b>Temperature:</b>	16 °C
<b>Relative Humidity:</b>	45 %
<b>ATM Pressure:</b>	101.5kPa

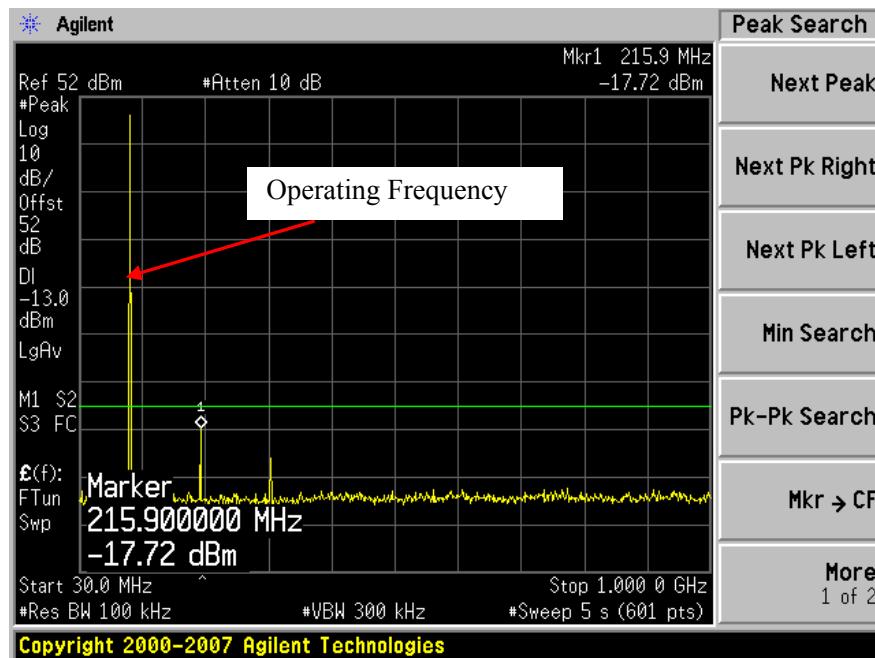
\* Testing performed by Jack Liu on 2009-02-18 in RF test site.

## 6.6 Test Results

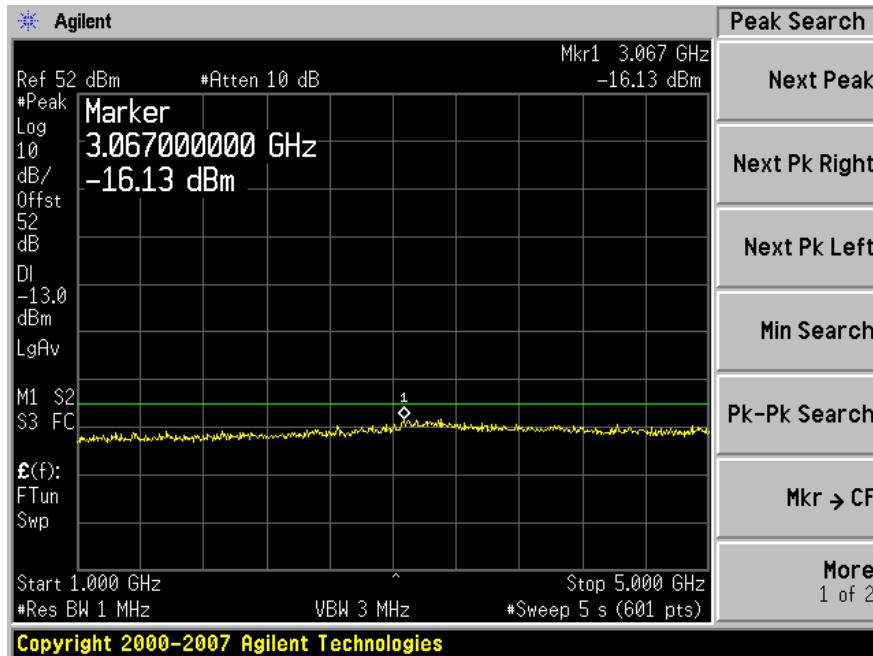
Please refer to the following plots.

Note: Attenuation Limit = 65 dB (-13 dBm)

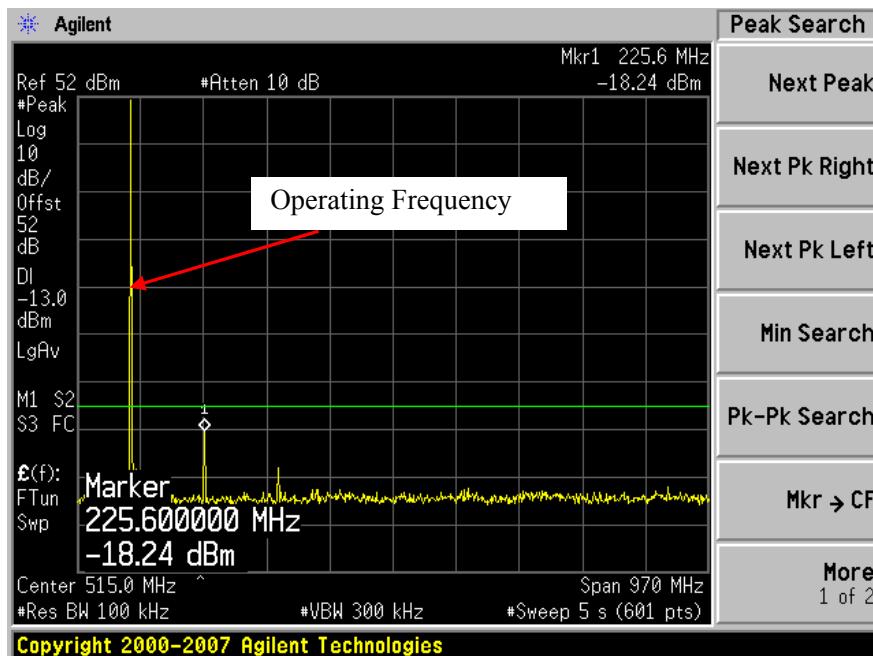
**Plot 1: Low Channel 30MHz to 1GHz**

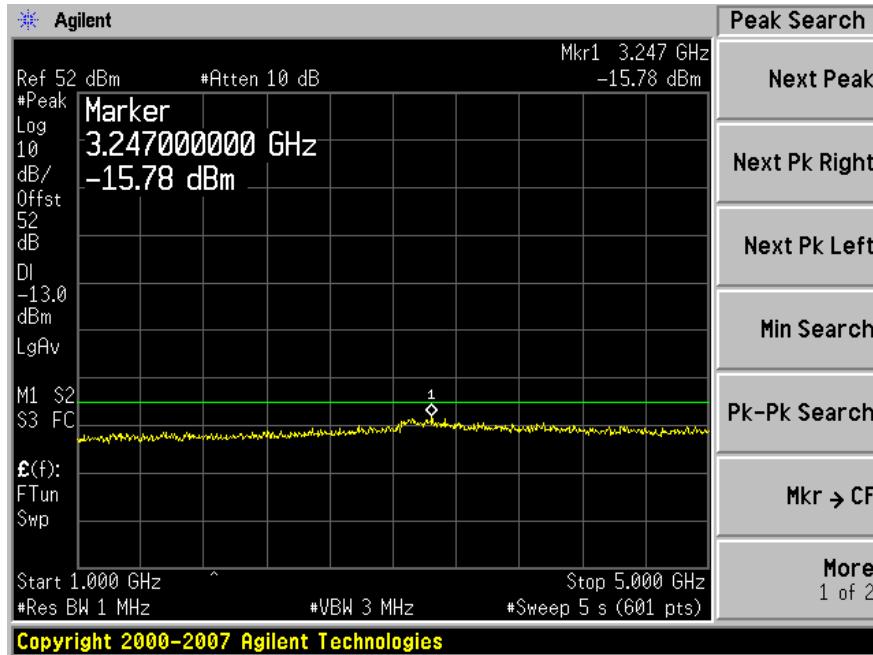
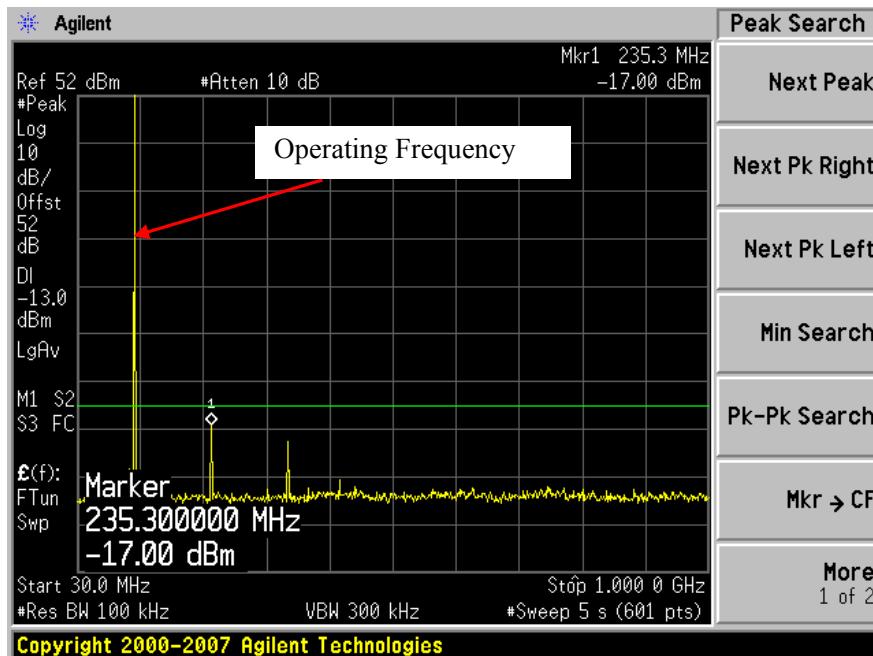


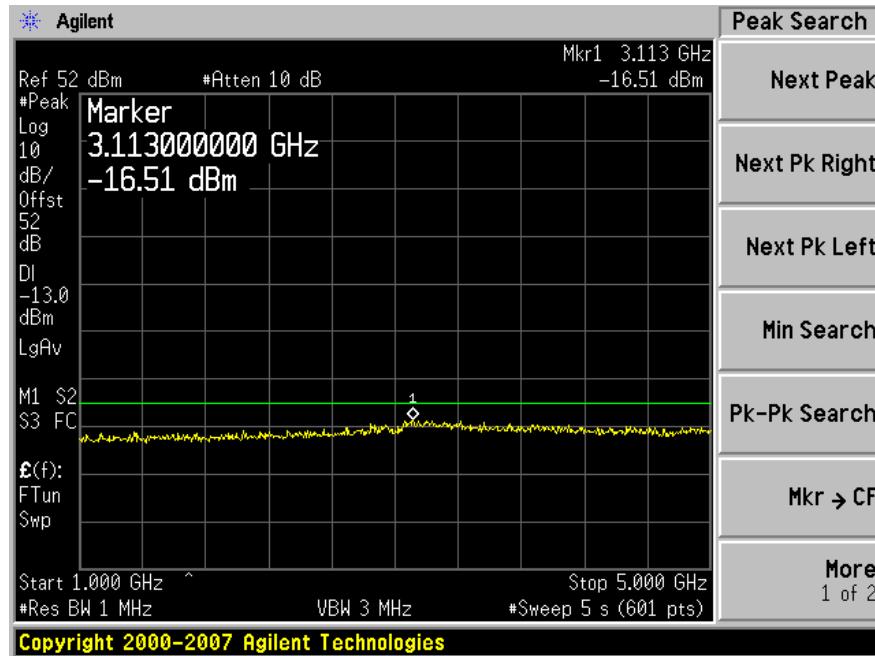
Plot 2: Low Channel 1GHz to 5GHz

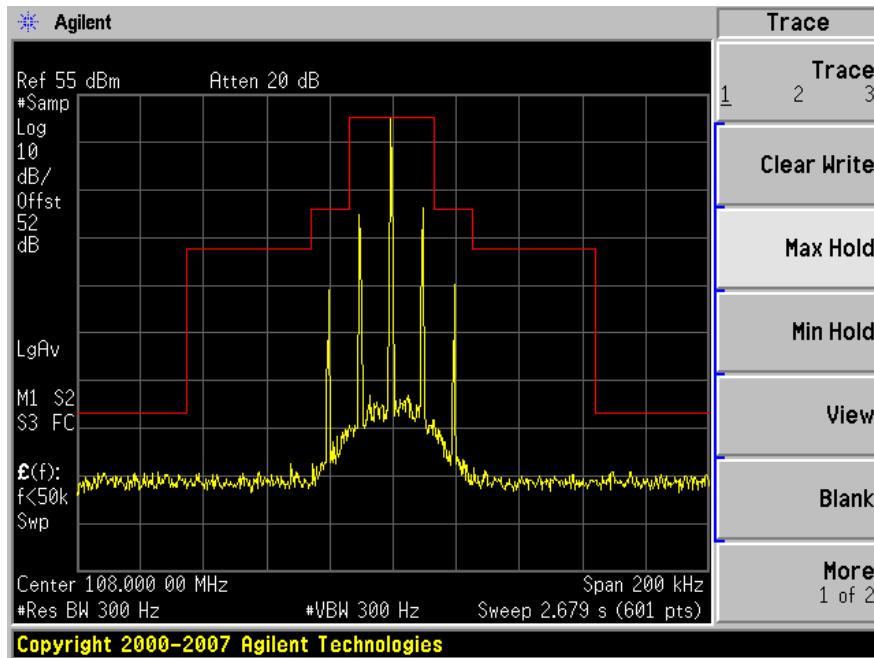
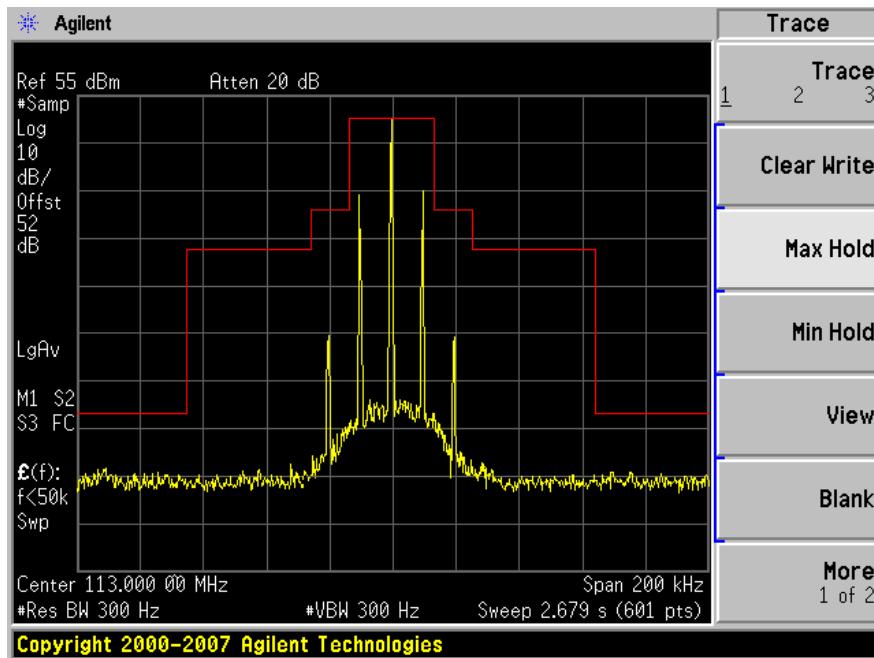


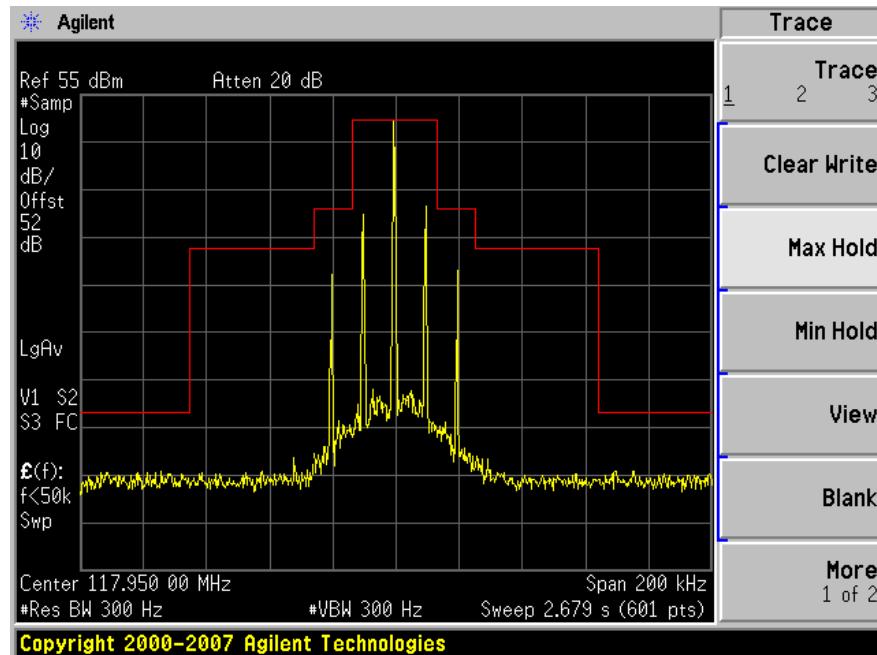
Plot 3: Middle CH 30MHz to 1GHz



**Plot 4: Middle CH 1GHz to 5GHz****Plot 5: High Channel 30MHz to 1GHz**

**Plot 6: High Channel 1GHz to 5GHz**

**Emission Mask****Low Channel @ 108 MHz (9960Hz Modulation)****Middle Channel @ 113 MHz (9960Hz Modulation)**

**High Channel @ 117.95 MHz (9960Hz Modulation)**

## 7 §2.1053 & §87.139 - FIELD STRENGTH OF SPURIOUS EMISSION, SUPPRESSION OF INTERFERENCE

### 7.1 Applicable Standards

§2.1053 and §87.139

### 7.2 Test Procedure

TIA/EIA 603-C Clause 2.2.12

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

The EUT Removed and replaced with a substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \log (\text{TX Power in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \log_{10} (\text{Power out in Watts})$   
=  $43 + 10 \log_{10} (150) = 65$  dB

### 7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Due Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-05-31
Agilent	Analyzer, Communications	E5155C	GB44051221	2009-08-08
Sunol Sciences	Antenna	JB1	A103105-3	2009-03-25
A.R.A	Horn Antenna	DRG-118/A	1132	2009-07-28
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2009-07-01
HP	Pre-Amplifier	8449B	3008A01978	2009-10-21
HP	Pre-Amplifier	8447D	2944A06639	2009-12-19

\* *Statement of Traceability:* BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

## 7.4 Environmental Conditions

<b>Temperature:</b>	14 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.2kPa

\* Testing performed by Jack Liu on 2009-02-17 in 5m chamber 3.

## 7.5 Test Results

Transmitting at Middle Channel (113 MHz)

Indicated		Azimuth (degree)	Test Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)	
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Ant. Gain Cord. (dBi)				
36.5	70.89	326	100	V	36.5	-38	0	0.27	-38.27	-13	-25.27
240.2	64.22	277	100	H	240.2	-55	0	0.37	-55.37	-13	-42.37

Note: All other emissions in the required measurement range were more than 20 dB below the required Limit.

## **8 §2.1047 & §87.141 - MODULATION CHARACTERISTICS**

### **8.1 Applicable Standard**

§ 2.1047 and §87.141

### **8.2 Test Procedure**

Modulation Limiting:

TIA-603-C 2.2.3.2

Audio Frequency Response:

TIA-603-C 2.2.6.2.2

### **8.3 Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Due Date
HP	RF Communication Test Set	8920A	3438A05338	2010-03-20
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-05-31

\* *Statement of Traceability:* BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### **8.4 Environmental Conditions**

<b>Temperature:</b>	16 °C
<b>Relative Humidity:</b>	45 %
<b>ATM Pressure:</b>	101.5kPa

\* Testing performed by Jack Liu on 2009-02-18 in RF test site.

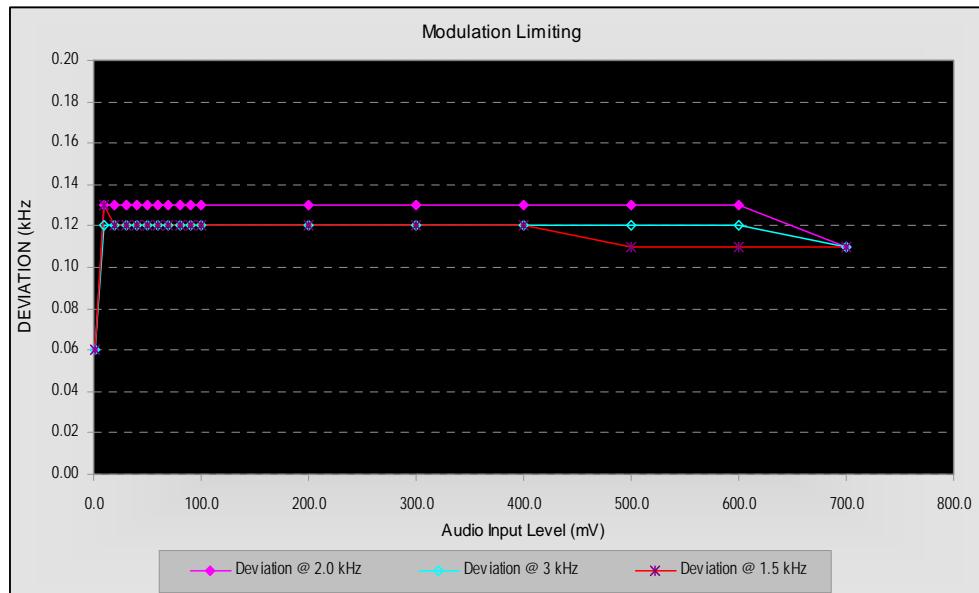
### **8.5 Test Results**

Classes of Emission: A9W

Please refer to the following plots.

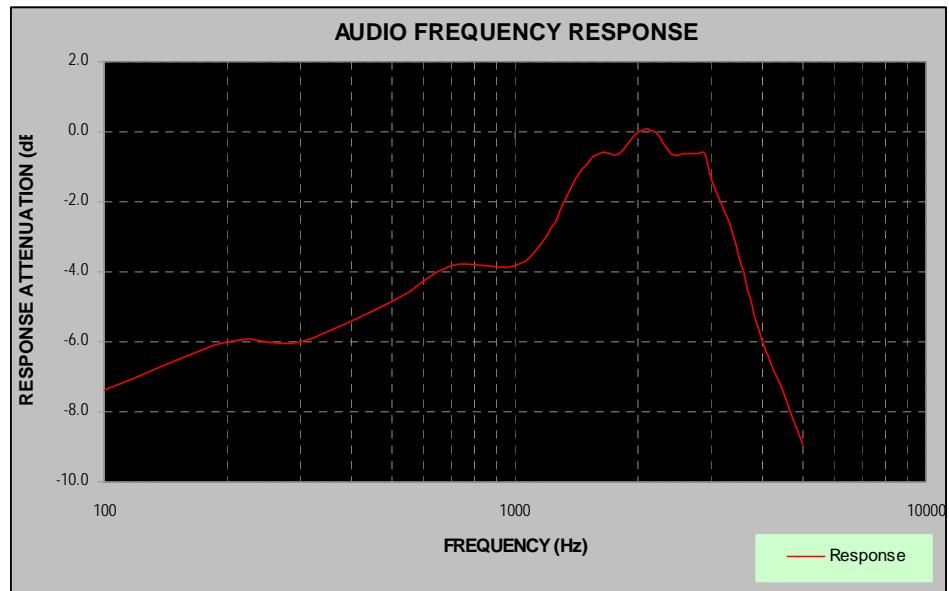
### Modulation Limiting

Test Frequency: Middle Channel @ 113 MHz



### Audio Frequency Response

Test Frequency: Middle Channel @ 113 MHz



## **9 §2.1055, §87.133 – FREQUENCY STABILITY**

### **9.1 Applicable Standard**

§2.1055 and §87.133

### **9.2 Test Procedure**

Frequency Stability vs. Temperature:

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed through attenuators. EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the frequency counter.

Frequency Stability vs. Voltage:

An external variable DC power supply was connected to the EUT. The voltage was set to 115%, 100%, and 85% of the nominal operating input voltage, and the frequency output was recorded from the frequency counter.

### **9.3 Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Due Date
Espec	Chamber, Humidity	ESL-4CA	18010	2009-12-10
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-05-31

*\* Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

### **9.4 Environmental Conditions**

<b>Temperature:</b>	14 °C
<b>Relative Humidity:</b>	45 %
<b>ATM Pressure:</b>	101.2kPa

*\* Testing performed by Jack Liu on 2009-02-18 in RF test site.*

## 9.5 Test Results

Frequency Stability with Temperature:

Test Environment		Channel Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Error (ppm)	Limit (ppm)
Supply Voltage (Vac)	Temperature (°C)					
120	-30	113.000000	112.998300	0.001700	15.044248	± 50
	-20	113.000000	112.998700	0.001300	11.504425	± 50
	-10	113.000000	112.998450	0.001550	13.716814	± 50
	0	113.000000	112.999200	0.000800	7.079646	± 50
	10	113.000000	112.999920	0.000080	0.707965	± 50
	20	113.000000	112.998420	0.001580	13.982301	± 50
	30	113.000000	112.999300	0.000700	6.194690	± 50
	40	113.000000	112.999400	0.000600	5.309735	± 50
	50	113.000000	112.999300	0.000700	6.194690	± 50

Frequency Stability with Supply Voltage:

Test Environment		Channel Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Error (ppm)	Limit (ppm)
Voltage Variation (%)	Supply Voltage (Vac)					
-15.0	102	113.000000	112.999400	0.000600	5.309735	± 50
0.0	120	113.000000	112.999350	0.000650	5.752212	± 50
15.0	138	113.000000	112.999750	0.000250	2.212389	± 50

## 10 §87.149 – SPECIAL REQUIREMENTS FOR AUTOMATIC LINK ESTABLISHMENT (ALE)

### 10.1 Applicable Standards

As per Part 87.149,

Brief signaling for the purposes of measuring the quality of a radio channel and thereafter establishing communication shall be permitted within the 2 MHz–30 MHz band. Public coast stations licensed under part 80 of this chapter providing high seas service are authorized by rule to use such signalling under the following conditions:

- (a) The transmitter power shall not exceed 100 W ERP;
- (b) Transmissions must sweep linearly in frequency at a rate of at least 60 kHz per second, occupying any 3 kHz bandwidth for less than 50 milliseconds;
- (c) The transmitter shall scan the band no more than four times per hour;
- (d) Transmissions within 6 kHz of the following protected frequencies and frequency bands must not exceed 10  $\mu$ W peak ERP:

#### (1) Protected frequencies (kHz)

2091.0	4188.0	6312.0	12290.0	16420.0
2174.5	4207.5	8257.0	12392.0	16522.0
2182.0	5000.0	8291.0	12520.0	16695.0
2187.5	5167.5	8357.5	12563.0	16750.0
2500.0	5680.0	8364.0	12577.0	16804.5
3023.0	6215.0	8375.0	15000.0	20000.0
4000.0	6268.0	8414.5	16000.0	25000.0
4177.5	6282.0	10000.0		

#### (2) Protected bands (kHz)

4125.0–4128.0  
8376.25–8386.75  
13360.0–13410.0  
25500.0–25670.0

(e) The instantaneous signal, which refers to the peak power that would be measured with the frequency sweep stopped, along with spurious emissions generated from the sweeping signal, must be attenuated below the peak carrier power (in watts) as follows:

- (1) On any frequency more than 5 Hz from the instantaneous carrier frequency, at least 3 dB;
- (2) On any frequency more than 250 Hz from the instantaneous carrier frequency, at least 40 dB; and
- (3) On any frequency more than 7.5 kHz from the instantaneous carrier frequency, at least  $43 + 10\log_{10}$  (peak power in watts) dB.

Compliant

N/A

## 11 §87.151 – SPECIAL REQUIREMENTS FOR DIFFERENTIAL GPS RECEIVERS

### 11.1 Applicable Standards

As per Part 87.151

- (a) The receiver shall achieve a message failure rate less than or equal to one failed message per 1000 full-length (222 bytes) application data messages, while operating over a range from  $-87$  dBm to  $-1$  dBm, provided that the variation in the average received signal power between successive bursts in a given time slot shall not exceed 40 dB. Failed messages include those lost by the VHF data receiver system or which do not pass the cyclic redundancy check (CRC) after application of the forward error correction (FEC).
- (b) The aircraft receiving antenna can be horizontally or vertically polarized. Due to the difference in the signal strength of horizontally and vertically polarized components of the broadcast signal, the total aircraft implementation loss is limited to 15 dB for horizontally polarized receiving antennas and 11 dB for vertically polarized receiving antennas.
- (c) Desensitization. The receiver shall meet the requirements specified in paragraph (a) of this section in the presence of VHF-FM broadcast signals in accord with following tables.

(1) Maximum levels of undesired signals.

Frequency <sup>1</sup>	Maximum level of undesired signal at the receiver input (dBm)
50 kHz up to 88 MHz	-13
88 MHz–107.900 MHz	[see paragraph (c)(2)]
108.000 MHz–117.975 MHz	excluded
118MHz	-44
118.025 MHz	-41
118.050 MHz up to 1660.5 MHz	-13

<sup>1</sup>The relationship is linear between single adjacent points designated by the above frequencies.

(2) Desensitization frequency and power requirements for the frequencies 108.025 MHz to 111.975 MHz.

Frequency <sup>1</sup>	Maximum level of undesired signal at the receiver input (dBm)
$88 \text{ MHz} \leq f \leq 102 \text{ MHz}$	15
104 MHz	10
106 MHz	5
107.9 MHz	-10

<sup>1</sup>The relationship is linear between single adjacent points designated by the above frequencies.

(3) Desensitization frequency and power requirements for the frequencies 112.00 MHz to 117.975 MHz.

Frequency <sup>1</sup>	Maximum level of undesired signal at the receiver input (dBm)
88 MHz $\leq$ f $\leq$ 102 MHz	15
104 MHz	10
106 MHz	5
107.9 MHz	-10

<sup>1</sup>The relationship is linear between single adjacent points designated by the above frequencies.

(d) Intermodulation immunity. The receiver shall meet the requirements specified in paragraph (a) of this section in the presence of interference from two-signal, third order intermodulation products of two VHF-FM broadcast signals having levels in accordance with the following:

- (1)  $2N_1 + N_2 + 72 \leq 0$  for VHF-FM sound broadcasting signals in the range 107.7–108 MHz; and
- (2)  $2N_1 + N_2 + 3(24 - 20\log \Delta f / 0.4) \leq 0$  for VHF-FM sound broadcasting signals below 107.7 MHz, where the frequencies of the two VHF-FM sound broadcasting signals produce, within the receiver, a two signal, third-order intermodulation product on the desired VDB frequency.
- (3) In the formulas in paragraphs (d)(1) and (d)(2) of this section,  $N_1$  and  $N_2$  are the levels (dBm) of the two VHF FM sound broadcasting signals at the VHF data broadcast (VDB) receiver input. Neither level shall exceed the desensitization criteria set forth in paragraph (c) of this section.  $\Delta f = 108.1 - f_1$ , where  $f_1$  is the frequency of  $N_1$ , the VHF FM sound broadcasting signal closer to 108.1 MHz.

Compliant

N/A

## 12 §2.1091 - RADIOFREQUENCY RADIATION EXPOSURE EVALUATION

### 12.1 Applicable Standards

#### § 2.1091

(a) Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this chapter, in particular §1.1307(b).

According to §1.1310 and §2.1091 RF exposure is calculated.

#### Limits for Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,00	/	/	1	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	842/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/150	30
1500-100,000	/	/	1	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.

**MPE Prediction**

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal (dBm): 49.89

Maximum peak output power at antenna input terminal (mW): 97498.96

Prediction distance (cm): 1000

Prediction frequency (MHz): 108

Maximum Antenna Gain, typical (dBi): 3

Maximum Antenna Gain (numeric): 2

Power density of prediction frequency at 1000 cm (mW/cm<sup>2</sup>): 0.016

MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>): 0.36

**Conclusion:**

MPE will be addressed at the time of licensing.