FCC

TEST/MEASUREMENT REPORT

Product Name: J-DR05

Model: J-DR05

Applicant/Manufacturer: EAGLE WIRELESS INTERNATIONAL, INC.
101 Courageous Drive
League City, Texas 77573

Tested By Request of: Eagle Wireless International, Inc.

Testing Laboratory:

Wayne Langston, Inc.
P.O. Box 1377, League City, Texas 77574-1377
Tel: 281-337-6785; Fax: 281-337-7217; email: langstoninc@msn.com

Test Results**:**

I certify that I am the technically qualified person responsible for preparation of the technical information contained in this application, and that it is complete and accurate to the best of my knowledge.

Tested By: Date: October 22, 2003

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1. INTRODUCTION

The following data has been taken in support of an Application for Type Acceptance for the Eagle Wireless International Iradium Repeater (FCC ID LOKJHJLBT05A00021) in accordance with Part 25.

1.1 Test Facility:

Noted and Complies.

This test site is located adjacent to the building in League City, Texas, 77573. All equipment is calibrated thru primary standards. Calibration period is 1 year and is accomplished in August of each year any alterations to this schedule is noted in the test data. Wayne Langston, Inc. has received NVLAP Accreditation, Certificate No. 200021-0.

1.2 Test Samples:

A representative sample of the Equipment Under Test (EUT), was tested and the test results for this sample provided are located in the Appendix.

1.3 Test Results:

The results from this testing apply only to the sample that was tested. The findings do not

make any suggestions about how the product is to be used nor does Wayne Langston, Incorporated make any recommendations regarding the product's usage.

2. INFORMATION REQUIRED FOR TYPE ACDEPTANCE / CERTIFICATION PER PART 2

Paragraphs

2.1033(a) A completed FCC Form 731 is included with this application.

2.1033(1) Applicant/Vendor/Manufacturer:

Eagle Wireless International, Inc.

101 Courageous Drive

League City, Texas 77573

2.1033(2) This equipment is identified as the Iradium Repeater

FCC ID: LOKJHJLBT05A00021

2.1033(3) Installation manual is not available to the user.

2.1033(4) The circuit functions are described in the Appendix.

2.1033(10) Complete circuit diagram is attached to this application.

2.1033(11) Label drawing and label placement are provided with this application

2.1033(12) Photographs are included with this application.

Part 25 Satellite Communications

6.0 Introduction

6.0.1 Product Description

The Eagle Iridium L-Band Repeater unit (ILR) is a uplink and downlink repeater designed

to be used in conjunction with the Iridium Subscriber System operating under the

frequency constraints outlined in CFR 25.20R(4): this repeater provides signal downlink

and uplink in obstructed areas.

These satellite phones consist of an L-Bank Transceiver (LBT) capable of simultaneous transmit and receive (duplex) operation covering the frequency range of 1616 MHz to 1626.5 MHz. The frequency accesses used for duplex channels are organized into sub-bands each of which contains eight frequency accesses. Each sub-band, therefore, occupies 333.33 kHz (i.e. 8 s 41.667 kHz). Up to 30 sub-bands containing 240 frequency accesses may be used for duplex channels.

6.1.1 Requirements

The Sebring is subject to FCC Part 25, Subpart C and Part 2 for FCC Certification for units marketed within the United States. The following tests, as specified in FCC Part 2, with limits as defined in FCC Part 25, and shown were performed on the Mobile Iridium Subscriber Unit (ISU). Frequency allocation is defined under 25.202(4)i.

Test Parameter	FCC Part 2 Paragraph Number	FCC Part 25 Paragraph Number	FCC Part 25 Limit
Spectrum Mask		25.202	Frequency Offset Atten 20.833-41.667 25 dBc 41.667-104.16 kHz 35 dBc >104.67 kHz 43+10 log (Pt)
Spurious Emissions Antenna Terminals	2.1051	25.202 25.213	Same as above
Radiated Spurious Emissions	2.1053	"	"
Carrier Frequency Stability-Temperature *	2.1055	25.202	0.001%
Carrier Frequency Stability-Voltage *	2.1055	25.202	0.001%

* As the EUT, Eagle Iridium L-Bank Repeater is a amplifier-noted filter only carrier frequency shifts is determined for the source handset, the unit may not perform.

6.1.2 Operational Configuration

The ILR EUT was operated in transmit mode at maximum rated output power of 5 Watts (+37 dBm) for uplink and 100 mw. The unit was configured for operation at three (3) different 'traffic channels', i.e. low, mid, and high, using the Iridium 9505 handset as the exciter (FCC ID: IHDT6NF1) driving the ILR EUT at the max input required to develop +37 dBm or + 10 dBm respectively. This was accomplished using Pads. These setting were accomplished through direct Key Pad Programming (KPP) with the 9505 in "Test

Mode".

Ancillary Equipment	Item Number
Handset	9505
L-Bank Repeater (ILR)	
Noted Filter	Lorch 6CFX-1624/10 S (Exciter)

A special test Subscriber identity Module (SIM) was required for KPP operation. The Test Mode is accessed by suspending the phone, i.e. depressing and holding the "#" key for approximately 3 seconds. The Static Traffic Channel command, "29xxyyzabc#", was used to select the appropriate channel and maximum power output level. The transmitter was modulated with typical DEQPSK modulation using pseudo-random data. General test setups are shown as Figures 6.1-1 and 6.1-2

Figure 6.1-1 General Radiated Test Setup for Tests

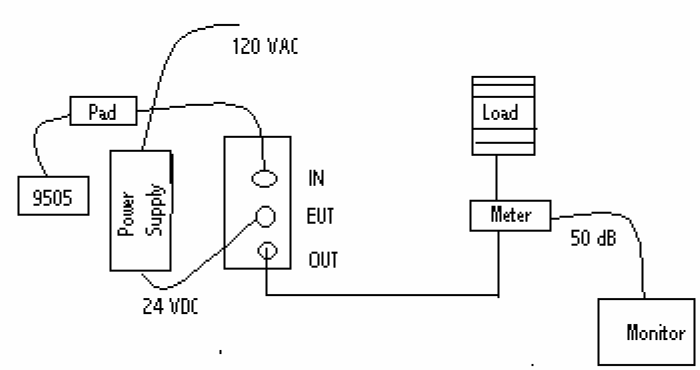
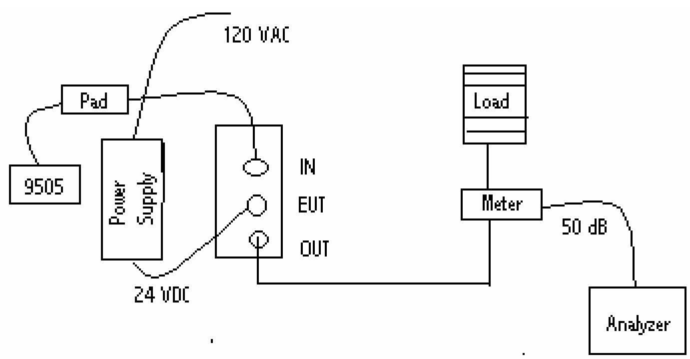


Figure 6.1-2 General Conducted Test Setup for Tests



6.1.3 Measurement Equipment

Rhode & Schwarz ESH/ESVP

HP 8591 + mixers

TEK 491 Spectrum Analyzer

6.1.4 Radiated Spurious Emissions Procedure

Radiated spurious emissions were measured over the frequency range of 30 MHz to 16.3 GHz in an anechoic chamber (20 ft x 24 ft x 16 ft) and an open area test site (OATS). Refer to Figure 6.1.2 and 6.1-3 for test setups.

The radiated emissions between 30 MHz and 1 GHz were initially measured in a semi-anechoic shield room in order to identify the emissions in an ambient free environment before proceeding to the open area test site (OATS). This provides the capability of taking accurate measurements in a higher ambient environment such as at the rooftop OATS. The Rhode and Schwarz EMI Receiver System was used for the pre-scans. Typically, signals within approximately 10 dB of the limit are noted for measurements on the OATS.

Final measurements on the OATS were taken with a Rhode 7 Schwarz EMI Receiver System at a 3-meter test distance from the receiving antenna. The Sebring was placed on a .8-meter high non-conductive table on a rotating turntable that is flush with the site ground plane. The receiving antenna was scanned over a height range from 1 to 4 meters in both antenna polarities, and the turntable was rotated 360 degrees. The highest emissions were recorded and the final field strength level determined using the following formula: Field Strength (dBμV/m)=Measured Level (dBμV) + Cable Loss (dB) + Antenna Factor (dB)

The radiated emissions between above 1 GHz were measured in an anechoic chamber using a EMCO 3115 Horn antenna at a 3-meter distance. The emissions were maximized by rotating the equipment on the turntable and by changing polarities of the antenna. The test methods of ANSI 63.4 were used for performing the Radiated Emissions tests.

6.1.5 Conducted Spurious Emission, 30 MHz to 16.3 GHz Procedure

Conducted spurious emissions are the radio frequency voltages or power generated within the equipment and appearing at the equipment's output terminal when properly loaded into its characteristic non-radiating artificial load. The mean power of the conducted spurious and harmonic emissions shall be attenuated below the mean output power of the transmitter by:

Frequency Offset	Attenuation (per 4 kHz)
20.833 to 41.667 kHz	25 dBc
41.337 to 104.16 kHz	35 dBc
> 104.16 kHz	51.45 dBc

In the range of the frequencies between 1559 to 1605 MHz, emissions shall not exceed an EIRP density level of –70 dBW/MHz (-40 dBm/MHz) averaged over any 20 ms period and –80 dBW (-50 dBm) for any discrete (BW<600 Hz) spurious emissions. EIRP measurements were performed using a maximum worst-case antenna gain of 3 dBi included in the offset of the measurement system along with other measurement system losses.

The spectrum was scanned from 30 MHz to the tenth harmonic of the carrier. The level of the carrier and the various conducted spurious and harmonic emissions were measured by means of a calibrated receiver system. All signals were measured with peak detection (worst case) except at frequencies between 50% to 250% of the carrier and the 1559 to 1605 MHz band where average measurements were taken using an external frame trigger from the unit under test.

6.2 Test Results

6.2.1 RF Power Output Data

The RF power output was measured with the indicated voltage and current applied into the RF Output Power. The RF output, DC current and RF Input Power are all time-averaged values which reflect a 9.2% (8.28 ms T x bursts/90 ms frame) transmit duty cycle characteristic of transceiver operation.

RF Output:	Power Input	Power Output	Gain	Actual
Downlink	-52 dBm	+20 dBm	+72 dB	+19.7
Uplink	-25 dBm	+37 dBm	+62 dB	36.98

Since the transceiver is intended for use with specific antennas (with a worst-case 3 dBi gain over isotropic and "non-standard" RF connector), EIRP is measured. The antenna substitution method was used. The results indicated is the maximum EIRP found over the channels and transceiver orientations tested. The measured value reported below again takes into account the transmit duty cycle of 9.2%.

Maximum EIRP: +30.7 dBm (1.2W)

6.2.2 Radiated Spurious Emissions Measurement Test Results

All measurements were made with the EUT transmitting at its maximum rated output of 100 and 5 watt powers. Most of the measured signals displayed significant margin, > 20 dB, as compared to the appropriate limits. All of the measured signals were below the required limits. .

The measured signals are shown in the data of Appendix A.

6.2.3 Conducted Spurious Emissions Measurement Test Results

The conducted spurious emissions were measured on the Sebring and were all below the required limits. The graphs in Appendix B illustrate the final measurement results.

6.2.4 Frequency Stability Measurement Test Results

N/A

Appendix A
Radiated Spurious Emission Measurements
30 MHz to 16.3 GHz

Radiated Test Results
Carrier at +37 dBm for 5 Watt Uplink

Channel @

Freq. (MHz)		Limit	Comments Margin
162.063	+37 dBm		
3242.126	-68 dBc	-51	
4863.0	-81 cBc	-51	
1625.646	+37 dBm		
3251.3	-70 dBc	-51	19
4876.928	-80.1 dBc	-51	29

All other emissions were > 20 dB before the limit

Appendix B
Spectrum Mask and Conducted Spurious Emission Measurements
30 MHz to 16.3 GHz

Figure 1 Uplink Mask

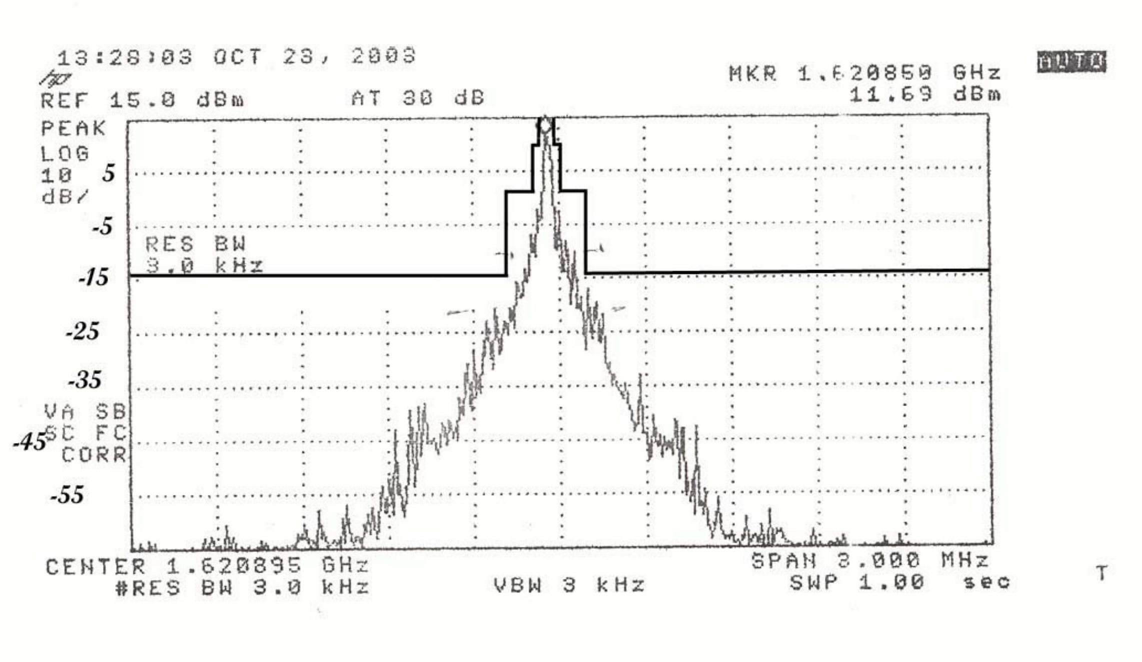


Figure 2 Downlink Mask

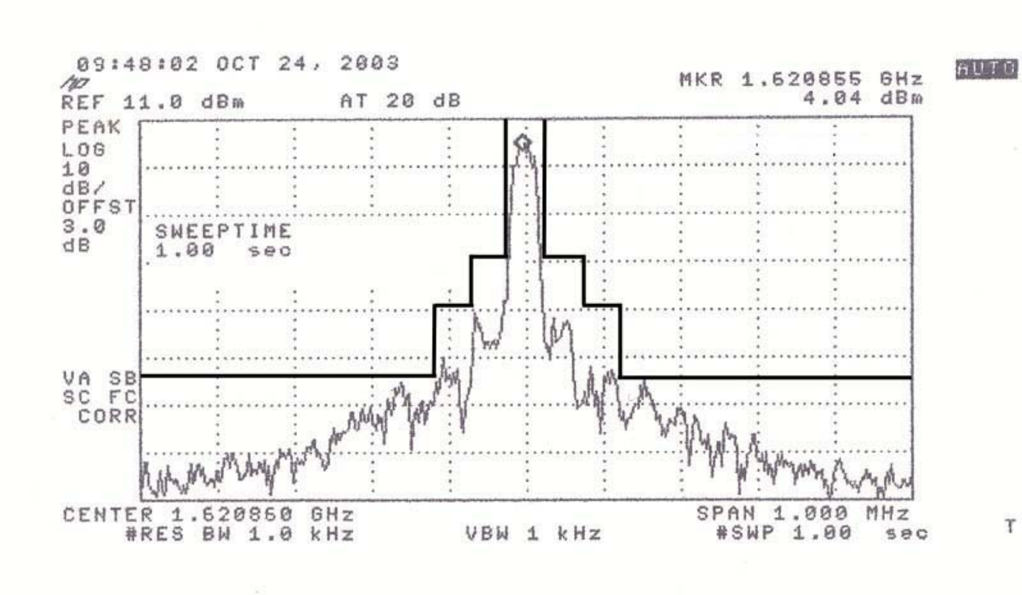
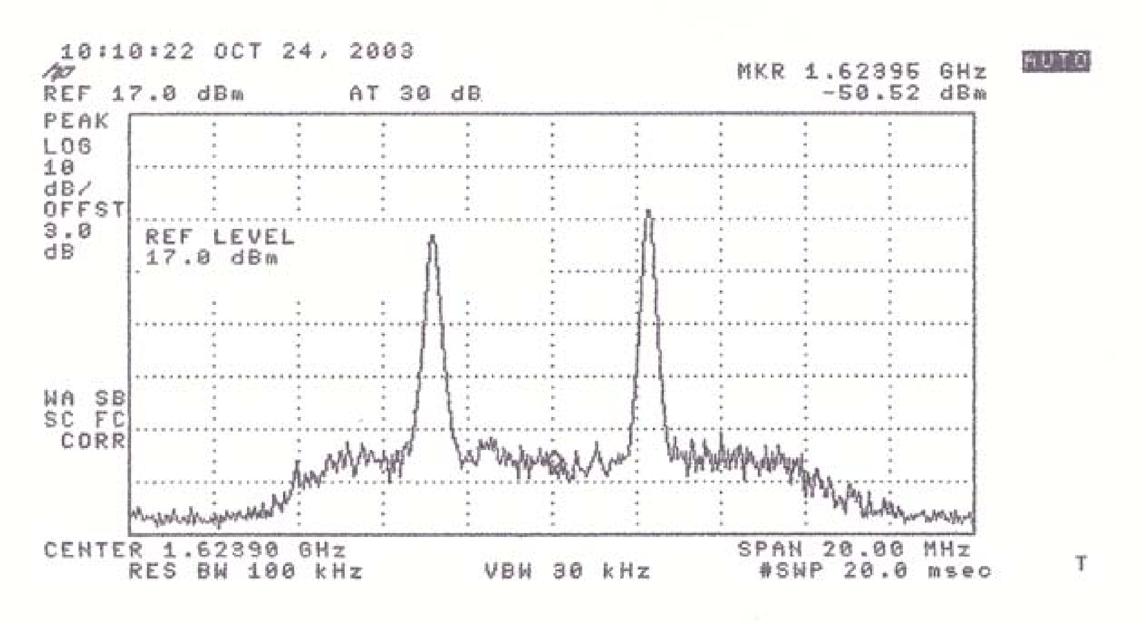
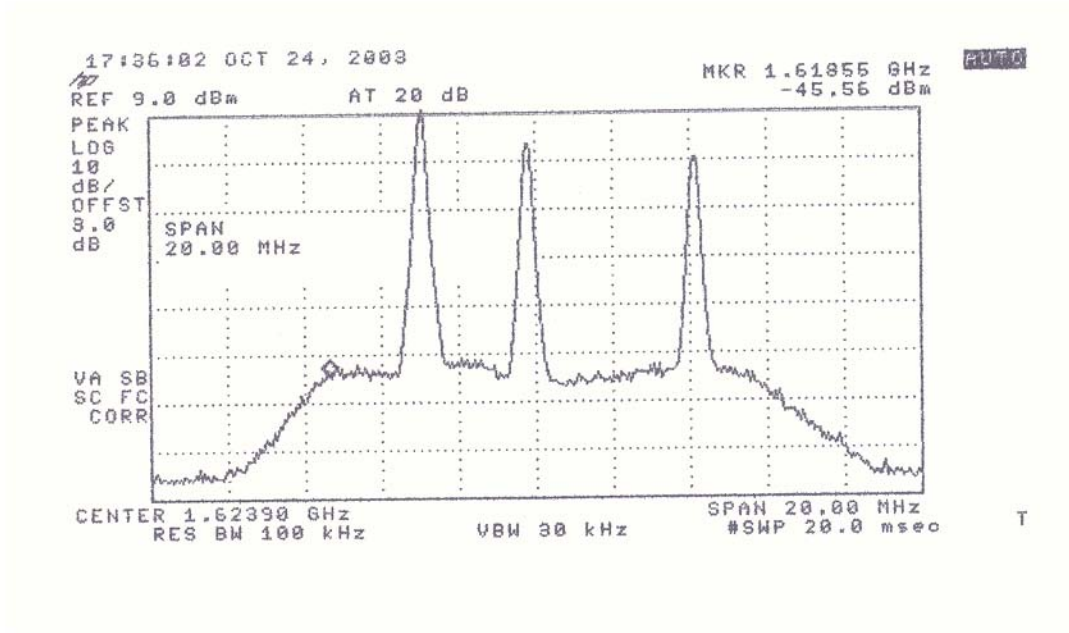


Figure 3 Inter-Modulation





4 transmission simultaneously

1 maximum wattage and 1 minimum wattage

These satellite phones consist of an L-Bank Transceiver (LBT) capable of simultaneous transmit and receive (duplex) operation covering the frequency range of 1616 MHz to 1626.5 MHz. The frequency accesses used for duplex channels are organized into sub-bands each of which contains eight frequency accesses. Each sub-band, therefore, occupies 333.33 kHz (i.e. 8 s 41.667 kHz). Up to 30 sub-bands containing 240 frequency accesses may be used for duplex channels.

Inter-modulation Conducted Data

The amplifier was placed on the Table in the Semi-Anechoic Chamber. The output of which, the uplink 5 Watt output, was placed on the input of an HP 8591 and eventually a TEK 491 25 GHz analyzer using proper attenuators. The input to the uplink was attached and the standard receive antennae phone. The transmit antennae was setup at 3 meters in semi-anechoic chamber with the 9505. The carriers was established at both ends of the allocated spectrum. The frequency specific was evaluated from 30 MHz to 16.3 GHz. A plot of one of these combinations is available in Figure 3. A complete list of the frequencies and actual plots as attached.