Table of Contents

Certificate of Compliance

Applicant:	Maxon America, Inc..
Applicant's Address:	10828 NW Air World Drive
	Kansas City, MO 64153
Model:	LAU1900 Wireless Local Loop Modem
Serial Number:	FCC#01
Project Number:	98-398
Test Dates:	April 1 through 3, 1988

I, Jeffrey A. Lenk, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures have reviewed the test setup, measurement data and this report. I believe them to be true and accurate. The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem** was tested and found to be in compliance with FCC Parts 15 and 24 for Intentional Radiators.

Jeffrey A. Lenk
President

1.0 Equipment Under Test (EUT) Description

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** was tested under AC and battery power. The LAU1900 operating under ac power was determined to be "worst case"; therefore, only data taken for ac powered operation is included within this report.

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** is designed for use in personal or commercial environments. This device is intended for operation under the Broadband PCS requirements of Part 24 (Subpart E). Specific test requirements include the following:

47 CFR 2.995(a) & 47 CFR 24.235	Frequency Stability vs. Temperature
47 CFR 2.995(d) (1) & 47 CFR 24.235	Frequency Stability vs. AC Wall Power
47 CFR 2.995(d) (2) & 47 CFR 24.235	Frequency Stability vs. Battery Power
47 CFR 1.310	Maximum Permissible Exposure (MPE)
47 CFR 24.232	Effective Radiated Power (ERP)
47 CFR 2.989	Occupied Bandwidth
47 CFR 24.238	Out of Band Emissions - Conducted
47 CFR 24.238	Out of Band Emissions - Radiated
47 CFR 22.919	Electronic Serial Number (ESN) *

* Included for informational purposes

Testing of this device was limited to Part 24 related CDMA compliance only. The **LAU1900** does not possess the capability to operate using standard analog celluar service. The primary impact of this requirement is in the area of radiated emissions.

The system tested consisted of the following components:

Manufacturer & Model	Serial #	FCC ID #	Description
Maxon America, Inc., LAU1900	FCC #02	F3JLAU1900	LAU1900 Wireless Local Loop Modem
Maxon America, Inc., LAU1900	FCC #01	F3JLAU1900	LAU1900 Wireless Local Loop Modem
Maxon America, Inc., A51813D	N/A	N/A	AC to DC Power Adapter
YUSA NP2-12	N/A	N/A	12 VDC Battery

System Peripherals:

Manufacturer & Model	Serial #	FCC ID #	Description
Radio Shack, Catalog No. 43-456A	062257	AA05G9-60535-KH-E	Desktop Phone Handset
Radio Shack, Slimline	143165	AC931-15489-TE-E	Slimline Phone Handset

The equipment within this report was tested to verify its compliance with FCC Rule Parts 2, 15 and 24, for Intentional Radiators. A separate verification report pursuant to Part 15, Subpart B has been prepared for the **Maxon America, Inc., LAU1900 Wireless Local Loop Modem** as a Digital Device. Based on Part 15.101, testing and generation of a report for the receiver portion of the LAU1900 is not required, though the unit is subject to the provisions of Part 15.5.

2.0 Frequency Stability

2.1 Frequency Stability versus Temperature

Measurements were made on the **LAU1900** to verify compliance with the frequency stability requirements of §2.995(a). Under this specification, the EUT is tested to verify satisfactory frequency stability versus changes in the ambient temperature.

2.1.1 Test Procedure

The tests were performed in a temperature and humidity test chamber. A Hewlett Packard 8924C CDMA Test Set was used to simulate a CDMA cell site and to monitor the transmit frequency of the EUT. The HP 8924C was set to display the frequency variation from the nominal value for the channel under test. This test was performed at a channel setting of 600 (center frequency = 1880.00 MHz), which is near the center of the PCS CDMA band. The output of the EUT was placed in a constant transmit mode at a level near the maximum output level for the **LAU1900**.

The temperature for the EUT was varied from -30 °C to +60 °C at 10 °C intervals. Increasing the operational test temperature range was done to accomidate Industry Canada test requirements. The EUT was allowed to soak at each temperature a minimum of 45 minutes prior to taking the frequency reading. The maximum frequency error was recorded at each data point.

2.1.2 Test Criteria

When combined, Sections 2.995 (a), and 24.235 indicate that the output spectrum of the transmitter shall remain within the appropriate channel band with ambient temperature for the EUT ranging from -30 °C to +50 °C. Based on general channel width requirements, the frequency error for this test should not exceed 9.5 kHz.

2.1.3 Test Results

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** meets the frequency stability requirements for frequency stability versus temperature variation based on the criteria listed above. Data for this test is located in Appendix A of this report.

2.2 Frequency Stability versus AC Wall Power

Measurements were made on the **LAU1900** to verify compliance with the frequency stability requirements of §2.995(d)(1). Under this specification, the EUT is tested to verify satisfactory frequency stability versus changes in the amplitude of the primary power for operation from the AC mains.

2.2.1 Test Procedure

The tests were performed in a temperature and humidity test chamber. A Hewlett Packard 8924C CDMA Test Set was used to simulate a CDMA cell site and to monitor the transmit frequency of the EUT. The HP 8924C was set to display the frequency variation from the nominal value for the channel under test. This test was performed at a channel setting of 600 (center frequency = 1880.00 MHz), which is near the center of the PCS CDMA band. The output of the EUT was placed in a constant transmit mode at a level near the maximum output level for the **LAU1900**.

Power to the input terminals of the AC to DC power adapter was varied from 102 to 138VAC at a nomial frequency of 60 Hz. The nomial AC mains power for this system is 120 VAC which is listed on the label for the AC to DC converter. The maximum frequency error was recorded at the nominal line voltage, + 15%, -15%, + 25% and -25% of nominal line voltage. The response of the EUT was monitored as the line voltage was changed.

2.2.2 Test Criteria

When combined, Sections 2.995 (d)(1), 22.355 and 22.917 indicate that the output frequency of the transmitter shall remain within the appropriate channel band with AC mains power being from 85% to 115% of the nominal value. Based on the analog channel width requirements, the frequency error for this test should not exceed 4 kHz.

2.2.3 Test Results

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** meets the frequency stability requirements for frequency stability versus AC mains input variation based on the criteria listed above. Data for this test is located in Appendix A of this report.

2.3 Frequency Stability versus AC Wall Power

Measurements were made on the **LAU1900** to verify compliance with the frequency stability requirements of §2.995(d)(2). Under this specification, the EUT is tested to verify satisfactory frequency stability versus changes in the amplitude of the battery power for the EUT.

2.3.1 Test Procedure

The tests were performed in a temperature and humidity test chamber. A Hewlett Packard 8924C CDMA Test Set was used to simulate a CDMA cell site and to monitor the transmit frequency of the EUT. The HP 8924C was set to display the frequency variation from the nominal value for the channel under test. This test was performed at a channel setting of 600 (center frequency = 1880.00 MHz), which is near the center of the PCS CDMA band. The output of the EUT was placed in a constant transmit mode at a level near the maximum output level for the **LAU1900**.

The battery for the EUT was removed and a variable level DC supply was attached to the battery terminals. The DC power level was varied from 10.5 to 14.0 VDC. The maximum frequency error was recorded at 0.5 volt intervals over this range.

2.3.2 Test Criteria

When combined, Sections 2.995 (d)(1), 22.355 and 22.917 indicate that the output frequency of the transmitter shall remain within the appropriate channel band with the battery power ranging from the nominal battery operating voltage to the battery operating end point. Based on the analog channel width requirements, the frequency error for this test should not exceed 4 kHz.

2.3.3 Test Results

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** meets the frequency stability requirements for frequency stability versus battery input voltage variation based on the criteria listed above. Data for this test is located in Appendix A of this report.

3.0 Maximum Permissible Exposure (MPE) Measurements

Measurements were made on the **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** to verify compliance with the Maximum Permissible Exposure Requirements (MPE) of §1.310, Table 1 (B). Due to size and weight of the EUT, **LAU1900** is not practical for use within 20 cm of a human. Based on the intended use for this product, the **LAU1900** would be used in a desktop, uncontrolled environment. This analysis indicates that the appropriate guidelines for indicating compliance with the radiofrequency radiation exposure limits would be MPE type criteria for an uncontrolled environment.

3.1 Test Procedure

The testing was performed in a 20' by 26' by 10' shielded enclosure with anechoic material placed throughout the enclosure to minimize reflections. The EUT was placed on a non-conductive turntable with the antenna in a vertical polarization. A Hewlett Packard 8924C CDMA Test Set was used to simulate a CDMA cell site using a small antenna placed in the room to provide a wireless link to the EUT. The test set was also used to monitor the power level & spectrum of the EUT during the test. Once the **LAU1900** had established a link to the test set, the transmit power level of the test set was reduced to allow the EUT to automatically increase its transmitted power to its maximum level. When the **LAU1900** was transmitting, a service test message was used which maximized the vocoder portion of the EUT. This resulted is maximum spectral density of the EUT during transmit operations. The amplitude of the signal was satisfactory to provide high power level throught the channels being used by the EUT.

An isotropic field strength meter was placed 20 cm from the antenna of the EUT. An initial survey was made to determine an approriate channel to perform the measurements and verify test heights & locations. These tests indicated that the level of the RF transmit signal was unifrom through the channel band and that the worst case height for MPE emissions was 10 cm above the bottom of the EUT. Measurements of powe density were made at 45 degree intervals around the EUT at a height of 10 cm. Spot checks of signal levels at 20 cm above and below the EUT were made to verify compliance with the specification.

3.2 Test Criteria

Section 1.1310, Table 1 (B), indicates a maximum permissible exposure level of 1.0 mW/cm^2 for transmitters operating between 1500 and 100,000 MHz. Averaging time for this measurement is specified at 30 minutes.

3.3 Test Results

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** meets the §1.1310 criteria for maximum permissive exposure. Data for this test is located in Appendix B of this report.

4.0 Effective Radiated Power (ERP) Measurements

Measurements were made on **Maxon America, Inc. Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** to verify compliance with the maximum effective radiated power (ERP) requirements of §24.232.

4.1 Test Procedure

All measurements were performed in a semi-anechoic chamber. Use of this environment for radiated emission testing is allowed for FCC compliance testing under Part 2.993 as long as the test environment is adequately documented. The EUT was placed on a turntable 1meter above the ground plane. The EUT location inside the chamber was no closer than 2 meters from any wall or absorber material. For radiated emission measurements, the measurement antenna was placed 1 meter from the EUT at the same height as the EUT. During ERP testing, the height of the antenna and the azimuth of the EUT relative to the measurement antenna was varied to maximize the measured signal level.

Prior to formal ERP testing, preliminary testing was performed to determine variation of the outpower of the device versus CDMA channel. This involved connecting the EUT directly to the CDMA test set and utlizing the dynamic range test. This test verifies that the output power of the EUT is automatically adjustable based on the relative power of the base station. Successful performance of this test is used to verify compliance with the requirement that the EUT only put out the minimum power necessary for reliable communications required by Part 24.232(e). The highest conducted output power recorded during this test is used to designate the output power of the EUT for the FCC Form 731.

No significant variation was found between the maximum output power during this test. Formal testing of the **LAU1900** for ERP testing was performed at a Channel Setting of 1190 (Center Frequency = 1909.5 GHz.

A Hewlett Packard 8924C CDMA Test Set was used to simulate a CDMA cell site using a small antenna placed in the room to provide a wireless link to the EUT. The test set was also used to monitor the power level & spectrum of the EUT during the test. Once the **LAU1900** had established a link to the test set, the transmit power level of the test set was reduced to allow the EUT to automatically increase its transmitted power to its maximum level. When the **LAU1900** was transmitting, the unit was placed in a service mode which maximized the spectrum produced by the device. The amplitude of the test signal was satisfactory to provide high power level throught the channels being used by the EUT.

4.2 Test Criteria

Section 24.232(e) requires that mobile/portable devices only output the power necessary for reliable communications. This indicates that the output power of the device should be automatically adjustable by the EUT based on relative base station power.

Section 24.232(e) also requires that the effective radiated power of mobile and portable transmitters be no greater than 2 watts. ERP testing was performed by measuring the maximum electric field from the EUT for the LAU1900 and translating this level to ERP using the following formula:

$$\mathbf{ERP = (E*r)/(30)^{1/2}}$$

Where:

E = Electric Field in v/m

r = distance from the measurement antenna to the EUT in meters

This formula was obtained from the Industy Canada document, 'Guidelines for Measurement of Radio Frequency Fields at Frequencies from 10 kHz to 300 GHz, Document Reference NIR-E, dated January 1994'.

4.3 Test Results

Measurements were performed utilizing a spectrum analyzer IF/video bandwidth of 3 kHz/10 kHz. The frequency span was set for 3 MHz and was centered on the peak of the output signal.

Data for ERP testing is located in Appendix C of this report. **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** met the §24.232 ERP and automatically adjustable power requirements.

5.0 Occupied Bandwidth Measurements

Measurements were made on **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** to determine the occupied bandwidth in accordance with Part 2.989.

5.1 Test Procedure

All measurements were performed in an controlled laboratory environment. The occupied bandiwdth of the LAU1900 was measured using a Hewlett Packard 8924C CDMA Test Set and a Hewlett Packard 8566 Spectrum Analyzer. A splitter/combiner was used to connect the RF ports of the EUT, CDMA test set and the spectrum analyzer together.

Occupied bandwidth was plotted for channels 20 and 1180. Based on section 24.238, the resolution and video bandwidths were set to 30 kHz. The occupied bandwidth was measured based on the emission width 26 dB below the peak emission level. The marker width for this measurement is shown on each plot.

5.2 Test Criteria

Section 2.989 requires that the occupied bandwidth for Type Accepted units be measured and reported as part of the device filing.

5.3 Test Results

Measurements were performed utilizing a spectrum analyzer IF/video bandwidth of 3 kHz/3 kHz. The frequency span was set for 5 MHz and was centered on the peak of the output signal. The occupied bandwidth was 1.435 for channel 20 and 1.440 for channel 1180.

Data for occupied bandwidth testing is located in Appendix D of this report. **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** has a worst case occupied bandwidth of 1.44 kHz based on the 26 dBc criteria.

6.0 Out of Band Emissions - Conducted

Conducted emissions measurements were made to determine out of band radiated noise produced by the **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** transmitter. All measurements were performed in the semi-anechoic chamber described in Section 4.1.

6.1 Test Procedure

The EUT was tested in a controlled laboratory environment. Measurement of the conducted antenna emissions from the **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** where performed by injecting a base station signal from a CDMA test set into the EUT through the tap port of a directional coupler. Measurement of the emissions from the LAU1900 were made by a spectrum analyzer attached to the output port of the directional coupler. The EUT was connected to the input port of the coupler, with the tap oriented to tap -20 dB referenced to the input port. This method provided minimal path loss of signals from the EUT to the analyzer by placing these two components in the through path of the coupler. The loss versus the test set is not critical as long as the power level generated by the EUT is constant.

All recorded data was taken using a peak detector. Bandwidths used for these measurements were based on the requirements of Part 24.238(b). The final measurements provided were determined by using the following formula:

Corrected Level = Recorded Level + Cable Loss

6.2 Test Criteria

Based on the out of band emission criteria of §24.238(a), transmitter related emissions for the **LAU1900** shall be reduced by the following amount with respect to the level of the fundimental:

43 + 10 log(P) dB

where P is the peak power of the unmodulated carrier in watts.

From the conducted dynamic range power measurements described in Section 4.1, the output power for the EUT can be calculated. This test indicated that maximum transmit power of the **LAU1900** is:

+25.54 dBm = 0.358 watts

Based on this test, out of band emissions for the LAU1900 shall be reduced by the following amount with respect to the level of the fundimental:

43 + 10 log(0.358) dB

= 38.5 dB below the fundimental

6.3 Test Results

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** operates over the frequency range 1854.5 to 1909.5 MHz. Testing was performed with the EUT set ot Channel 1175 (Transmit Frequency = 1908.25 MHz), which is almost at the highest operating channel of the device.

Conducted emission data sheets are contained in Appendix E of this report. The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** met the §24.238 conducted emission requirements.

7.0 Out of Band Emissions - Radiated

Radiated emissions measurements were made to determine out of band radiated noise produced by the **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** transmitter. All measurements were performed in the semi-anechoic chamber described in Section 4.1.

7.1 Test Procedure

The EUT was placed on a non-conductive turntable 1 meter above the ground plane. A measurement antenna was positioned at a distance of 1 meter as measured from the closest point of the EUT. The **Maxon America, Inc. Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** was rotated 360° in the azimuth plane with the antenna parallel to the EUT.

A Hewlett Packard 8924 CDMA Test Set was used to simulate a CDMA cell site using a small antenna placed near the test site to allow a wireless link to the EUT. The test set was also used to monitor the power level & spectrum of the EUT during the test. Once the **LAU1900** had established a link to the test set, the transmit power level of the test set was reduced to allow the

EUT to automatically increase its transmitted power to a level near its maximum level. When the **LAU1900** was transmitting, the unit was placed in a service mode which maximized the spectrum produced by the device. The amplitude of the test signal was satisfactory to provide high power level throught the channels being used by the EUT.

A Hewlett Packard Spectrum Analyzer utilizing peak detection was used during the determination of worst-case orientation. All recorded data was taken using a peak detector. Bandwidths used for these measurements were based on the requirements of Part 24.238(b). The final measurements provided were determined by using the following formula:

Corrected Level = Recorded Level - Pre-Amp Gain + Antenna Factor + Cable Loss

7.2 Test Criteria

Based on the out of band emission criteria of §24.238(a), transmitter related emissions for the **LAU1900** shall be reduced by the following amount with respect to the level of the fundimental:

43 + 10 log(P) dB

where P is the peak power of the unmodulated carrier in watts.

From the conducted dynamic range power measurements described in Section 4.1, the output power for the EUT can be calculated. This test indicated that maximum transmit power of the **LAU1900** is:

+25.54 dBm = 0.358 watts

Based on this test, out of band emissions for the LAU1900 shall be reduced by the following amount with respect to the level of the fundimental:

43 + 10 log(0.358) dB

= 38.5 dB below the fundimental

7.3 Test Results

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** operates over the frequency range 1854.5 to 1909.5 MHz. Testing was performed on the a channel just above the maximum operating rangefor this device (Channel 1190, which has a center frequency of 1909.5 GHz) since this mode should produce the highest range of harmonics for this device.

Radiated emission data sheets are contained in Appendix F of this report. The**Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** met the §24.238 radiated emission requirements.

8.0 Electronic Serial Number Assignment

While ESN evaluation is not required for Part 24 compliance, testing of the **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** to verify that this equipment does possess an ESN which meets industry standard ESN software and hardware requirements. The technical requirements of FCC Part 22.919 were used as a basis for this evaluation.

A conducted signal evaluation were made to determine if the **LAU1900** transmitter possessed an Electronic Serial Number (ESN) which was compliant with the J-STD-008 CDMA protocol and §22.919 criteria.

8.1 Test Procedure

The tests were performed in an controlled laboratory environment. A Hewlett Packard 8924C CDMA Test Set was used to simulate a CDMA cell site and to monitor the transmit frequency of the EUT. The HP 8924C was set to display the frequency variation from the nominal value for the channel under test. This test was performed at a channel setting of 600.

The HP 8924C Test Set was preset to only recognize signals which comply with the J-STD-008 CDMA criteria. This system has a 'recognition mode', which polls a mobile unit & reads its serial number if it meets the J-STD-008 criteria.

8.2 Test Criteria

Based on the ESN requirements of §22.919, the mobile transmitter shall meet the following criteria:

(a) Each unit shall have a unique 32 bit electronic serial number

(b) The ESN component must ber permanently attached to a main circuit board component and cannot be altered, through either software or hardware means.

(c) The ESN must utilize one or more of the following encryption means:

- Multiplication or Division by a Polynomial

- Cyclic Coding

- Spreading of the ESN bits ofver non-sequential memory locations

The J-STD-008 CDMA protocol contains specific details regarding the structure of the ESN which is compliant with the guidelines for §22.919. Basically, if a valid ESN is returned from the **LAU1900** using J-STD-008 CDMA protocol following interrogation by the test set and the ESN circuitry is hardwired into the unit, the **LAU1900** will meet the requirements of §22.919.

8.3 Test Results

Since the ESN is not channel dependent, two **Maxon America, Inc. LAU1900 Wireless Local Loop Modems** were interrogated at channel setting 600. These interrogation returned the following valid J-STD-008 CDMA protocol based ESNs:

EUT Designation	Manufacturer Provided ESN	Test Result ESN
FCC#01	00000000	00000000
FCC#02	00000000	00000000

The two test articles were programmed with the same ESN for prototype evaluation only. Full production units will possess different ESNs for each item. The ESNs will be hard coded in the device to prevent change or modification of the ESN once the unit has been manufactured.

The **Maxon America, Inc., LAU1900 Wireless Local Loop Modem (LAU1900)** met the §22.919 ESN requirements.

9.0 Form 731 Information

The following information is provided for inclusion in the FCC Form 731 for the **Maxon America, Inc. LAU1900 Wireless Local LoopModem.**

9.1 Emission Designator

Bandwidth:

The **LAU1900** utilizes a 1.2288 MHz chip rate as the primary component of the CDMA output for the device. This rate is processed into an J-STD-008 compliant signal with a resulting bandwidth of 1.25 MHz. This bandwidth is a requirement of the J-STD-008 specification.

Emission Designator::

The RF output signals of the **LAU1900** are complaint with the CDMA protocol requirements of J-STD-008. This output signal for this protocol is a frequency modulated signal containing voice, data and signaling information in a channel hopping mode. The emission for the LAU1900 can contain voice or non-voice data and will include signaling and traffic control information. This results in the emission designator being derived from the following components:

Symbol Position	Parameter	Description	Resulting Symbol
1	Type of Modulation	Frequency	F
2	Nature of Symbol(s) Modulating the Carrier	Composite Channel configuration w/ analog & digital information	9
3	Type of Information Being Transmitted	Voice & Digital Data (Combination)	W

This analysis results in an overall emission designator of F9W1M25.

9.2 Output Power

The rated output power of the **LAU1900** is 300 milliwatts. This is based on manufacturers data and test data for the ERP testing. In the autorange test performed during the ERP test sequence, the maximum power output for the three tested channels were withing a normal deviation of 100 milliwatts. The highest peak power between the 3 measured channels was 0.358 watts.

9.3 Frequency Band of Operation

The **LAU1900** is rated to be used through most of the authorized 1900 MHz CDMA band for mobile units. Production level units are firmware restricted to operate from Channel 25 to 1175. The prototype units tested under this effort were enabled to transmit over the entire 1900 MHz PCS band in order to provide worst case emission data at the band edges. Based on the production unit channel range, the transmit frequency range of the **LAU1900** is rated from 1851.25 to 1908.75 MHz.

10.0 List of Test Equipment

A list of the test equipment utilized to perform the conducted and radiated emission measurements is given below. The date of calibration is given for each.

Device	Description	Date Last Calibrated	Calibration Due
HP 8566B	Spectrum Analyzer	09/22/97	09/22/98
HP 85650A	Quasi Peak Adapter	02/10/97	02/10/98
MITEQ AFS4-00101800-40-10P-N	Preamplifier	10/23/97	10/23/98
Narda 8716	RF Hazard Controller Unit	03/15/98	03/15/99
Narda 8721	RF Hazard Probe	02/26/98	02/26/99
Mini-Circuits ZFDC-20-5	RF Splitter	3/29/98	3/29/99
Narda 3293-1	Directional Coupler	04/1/98	04/1/99
EMCO 3115	Double Ridged Horn Antenna	04/30/97	04/30/98
HP 8924C	CDMA Test Set	02/12/98	02/12/99
HP 83236B	PCS Interface	02/12/98	02/12/99
Fluke 45	Digital Multimeter	08/19/97	08/19/98
NJE SVC 60-14	Adjustable DC Power Supply	Not Required	Not Required
Elgar 1751SL	Power Supply	Not Required	Not Required
Elgar 400SD	Frequency Reference	Not Required	Not Required
Thermotron SM-32	Environmental Chamber	11/19/97	11/19/98

Appendix A Frequency Stability Test Data

Frequency Stability Versus Temperature Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 1, 1998

Temperature (Degrees C)	Frequency Deviation (Hz)	Deviation vs Limit (Hz)
60	215.00	9285.00
50	201.00	9299.00
40	142.00	9358.00
30	121.30	9378.70
20	-103.00	9397.00
10	-144.00	9356.00
0	-62.00	9438.00
-10	107.00	9393.00
-20	-91.00	9409.00
-30	66.00	9434.00

COMMENT #1: Reference Limit = 9.5 kHz

COMMENT #2: 45 minute soak at each temperature

TEST ENGINEER: _____ **APPROVED BY**: _____

Frequency Stability Versus AC Power Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 1, 1998

AC Line Voltage (V)	Frequency Deviation (Hz)	Deviation vs Limit (Hz)
144	12.50	9487.50
138	55.20	9444.80
120	-59.00	9441.00
102	-52.20	9447.80
96	60.00	9440.00

COMMENT #1: Reference Limit = 9.5 kHz

COMMENT #2: Nominal Line Voltage = 120 VAC at 60 Hz

TEST ENGINEER: _____ **APPROVED BY**: _____

Frequency Stability Versus DC Power Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 1, 1998

DC Supply Setting (V)	Frequency Deviation (Hz)	Deviation vs Limit (Hz)
14.0	-20.00	9480.00
13.5	-60.00	9440.00
13.0	-21.00	9479.00
12.5	-30.00	9470.00
12.0	-39.00	9461.00
11.5	-30.00	9470.00
11.0	48.50	9451.50
10.5	Ceased Operation	Ceased Operation

COMMENT #1: Reference Limit = 9.5 kHz

COMMENT #2:

TEST ENGINEER: _____ **APPROVED BY**: _____

Appendix B

Maximum Permissible Exposure (MPE) Test Data

Maximum Permissible Exposure Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 3, 1998

Orientation (Degrees)	Maximum Power Density (mW/cm^2)	Power Density Limit (mW/cm^2)	Margin (mW/cm^2)
0	0.11	1.27	-1.16
45	0.12	1.27	-1.15
90	0.13	1.27	-1.14
135	0.11	1.27	-1.16
180	0.09	1.27	-1.18
225	0.07	1.27	-1.20
270	0.02	1.27	-1.25
315	0.00	1.27	-1.27
Above	0.00	1.27	-1.27
Below	0.00	1.27	-1.27

COMMENT #1: Channel = 600 (1880.0 MHz)

COMMENT #2:

TEST ENGINEER: _____ **APPROVED BY:** _____

Appendix C

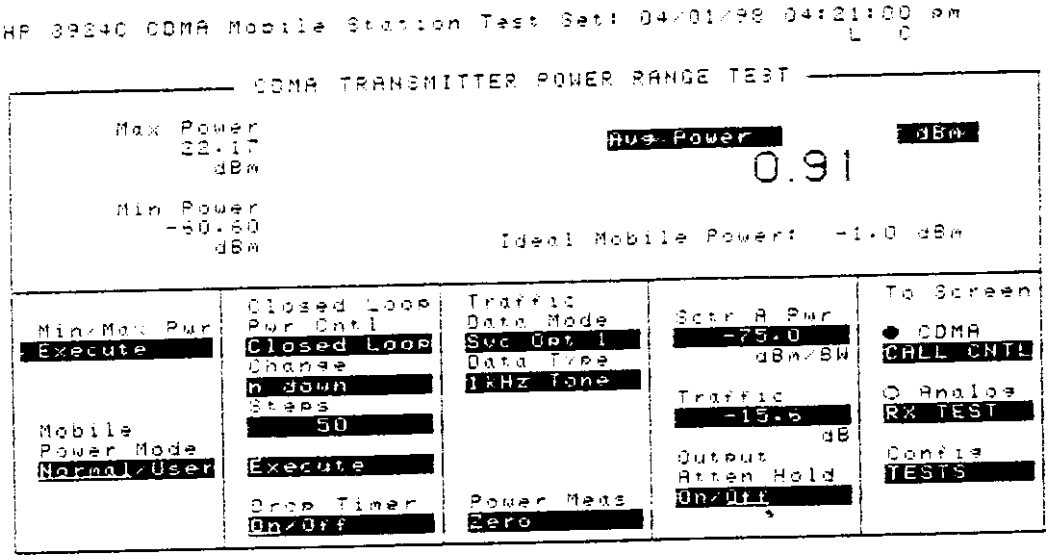
Effective Radiated Power (ERP) Test Data

Power Range Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02
DATE: April 1, 1998

PROJECT #: 98-398
Channel = 10



COMMENT #1: Channel = 10 (1850.5 MHz)

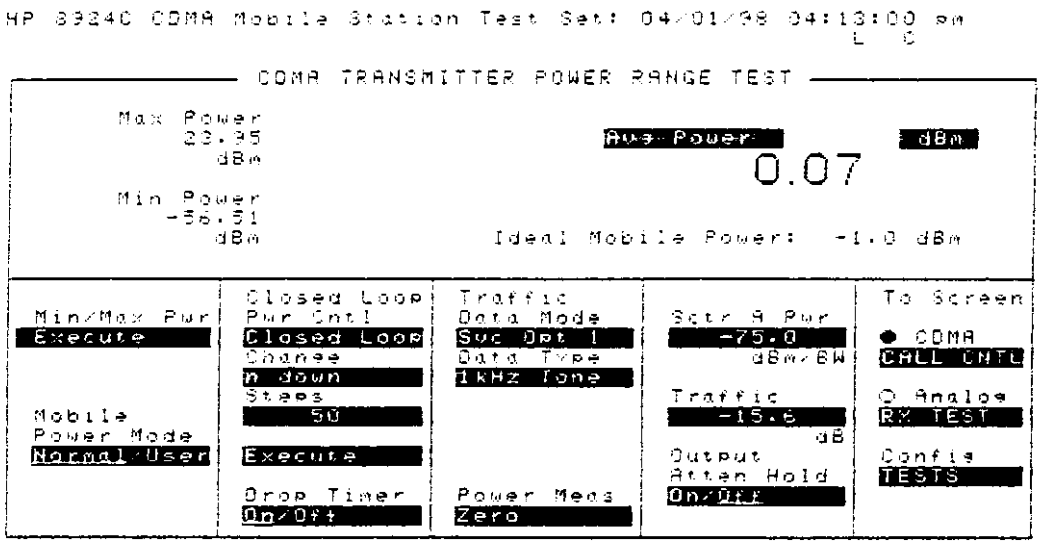
COMMENT #2: Maximum Power Output = Measured Value + Cable loss = 22.17 dBm + 1.5 dB = 23.67 dBm = 0.232 watts

TEST ENGINEER: _____ **APPROVED BY**: _____

Power Range Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 1, 1998 Channel = 600



COMMENT #1: Channel = 600 (1880.0 MHz)

COMMENT #2: Maximum Power Output = Measured Value + Cable loss = 23.95 dBm + 1.5 dB = 25.54 dBm = 0.358 watts

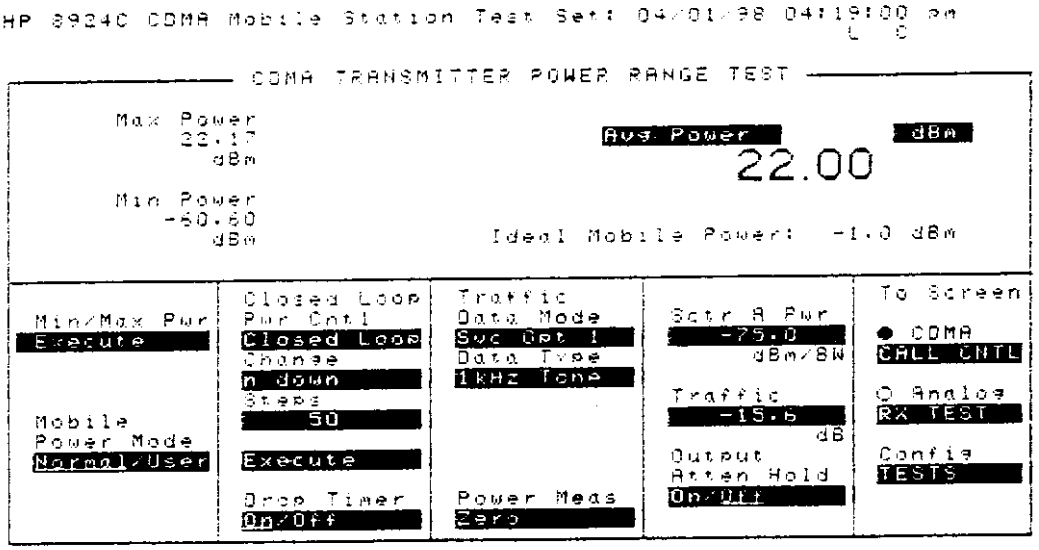
TEST ENGINEER: _____ **APPROVED BY:** _____

Power Range Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02
DATE: April 1, 1998

PROJECT #: 98-398
Channel = 1190



COMMENT #1: Channel = 1190 (1909.5 MHz)

COMMENT #2: Maximum Power Output = Measured Value + Cable loss = 22.17 dBm + 1.5 dB = 23.67 dBm = 0.232 watts

TEST ENGINEER: _____ **APPROVED BY:** _____

Effective Radiated Power Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 1, 1998

Channel	Freq. (MHz)	Recorded Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
20.0	1850.00	95.20	27.00	1.50	123.70	140.70	-17.00
600.0	1879.50	97.30	27.00	1.50	125.80	140.70	-14.90
1180.0	1909.50	94.50	27.00	1.50	123.00	140.70	-17.70

COMMENT #1: Limit = 2 watts. At a test distance of 1 meter, an EIRP of 2 watts can be converted to field strength as:

$E = (EIRP * (30)^{1/2})/r$ for r = 1 meter and EIRP = 2 watts, this becomes:

$= 2 * (30)^{1/2}) = 10.95$ v/m = 140.7 dBuV/m

COMMENT #2: All measurements made at an antenna height of 1 meter. Worst case emission direction for all measurements was 180 degrees.

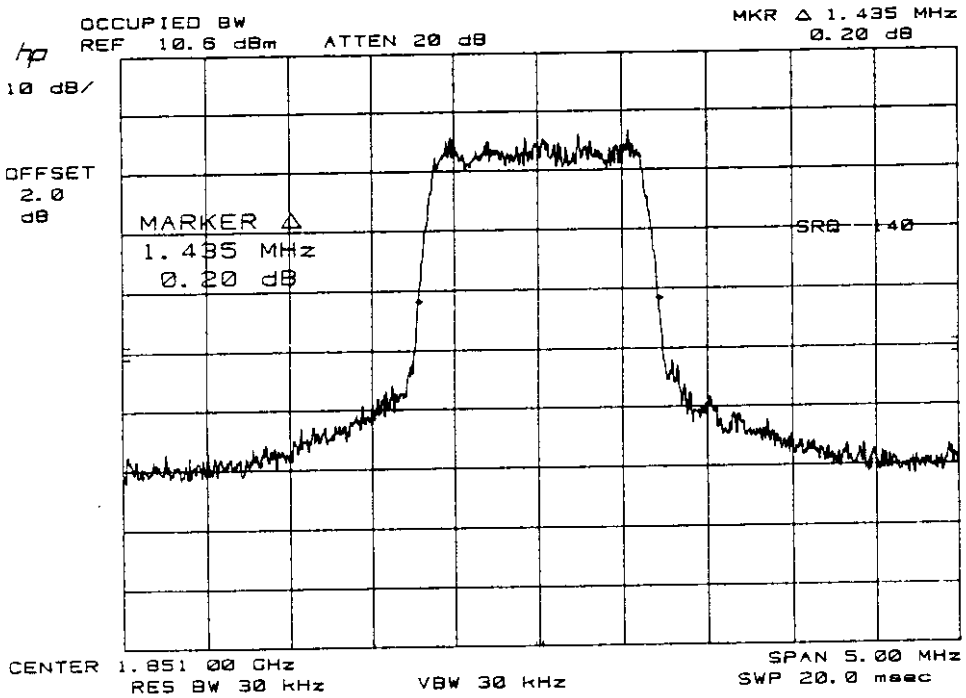
TEST ENGINEER: _____ **APPROVED BY:** _____

Appendix D Occupied Bandwidth Test Data

Occupied Bandwidth Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 1, 1998



COMMENT #1: Channel = 20 (1851.0 MHz)

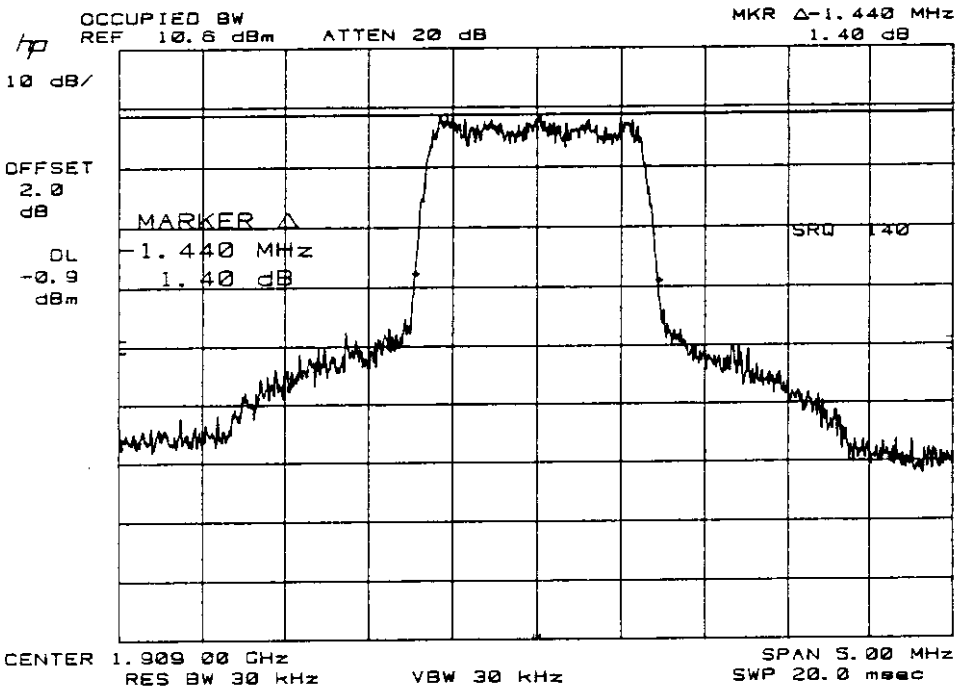
COMMENT #2: 26 dB Bandiwdth = 1.435 MHz

TEST ENGINEER: _____ **APPROVED BY:** _____

Occupied Bandwidth Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 1, 1998



COMMENT #1: Channel = 1180 (1909.0 MHz)

COMMENT #2: 26 dB Bandiwdth = 1.440 MHz

TEST ENGINEER: _____ **APPROVED BY:** _____

Appendix E

Out 0f Band Emissions Conducted Test Data

Out of Band Emission - Conducted Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02 PROJECT #: 98-398
DATE: April 1, 1998

Freq. (MHz)	Recorded Level (dBm)	Cable Loss (dB)	Amp Factor (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1908.2	-20.1	1.5	0.0	-18.6	Ref	Ref
1910.0	-68.4	1.5	0.0	-66.9	-56.6	-10.3
1911.0	-75.3	1.5	0.0	-73.8	-56.6	-17.2
2000.0	-67.7	1.5	0.0	-66.2	-56.6	-9.6
3000.0	-67.4	1.5	0.0	-65.9	-56.6	-9.3
4000.0	-67.0	1.5	0.0	-65.5	-56.6	-8.9
5000.0	-67.7	1.7	0.0	-66.1	-56.6	-9.5
5500.0	-69.0	2.0	0.0	-67.0	-56.6	-10.4
6112.0	-59.4	1.7	0.0	-57.7	-56.6	-1.1
8000.0	-60.4	1.1	0.0	-59.3	-56.6	-2.7
9000.0	-62.8	2.0	0.0	-60.8	-56.6	-4.2
10000.0	-62.4	2.9	0.0	-59.5	-56.6	-2.9
11000.0	-61.2	2.9	0.0	-58.3	-56.6	-1.7
12000.0	-63.1	4.4	0.0	-58.7	-56.6	-2.1
13350.0	-39.4	3.4	22.5	-58.5	-56.6	-1.9
15260.0	-48.6	3.4	22.4	-67.6	-56.6	-11.0
17158.0	-46.6	4.3	25.0	-67.3	-56.6	-10.7
19078.0	-47.4	3.4	21.0	-65.0	-56.6	-8.4

COMMENT #1: Channel Setting = 1175

COMMENT #2:

TEST ENGINEER: _____ **APPROVED BY:** _____

Appendix F

Out 0f Band Emissions Radiated Test Data

Out of Band Emission - Radiated Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02
DATE: April 1, 1998

PROJECT #: 98-398
POLARIZATION: Vertical

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBm)	Margin (dB)
1879.5	180.0	97.3	1.5	27.0	125.8	Ref	Ref
3758.0	180.0	40.7	1.5	31.4	73.6	87.8	-14.2
5640.0	180.0	45.6	1.5	34.6	81.7	87.8	-6.1
7520.0	180.0	47.9	1.5	37.2	86.6	87.8	-1.2
9400.0	180.0	45.9	1.5	38.0	85.4	87.8	-2.4
11280.0	180.0	45.8	1.5	38.7	86.0	87.8	-1.8
13160.0	180.0	24.7	1.7	39.9	66.3	87.8	-21.6
15040.0	180.0	17.7	2.0	39.4	59.1	87.8	-28.7
16920.0	180.0	4.1	1.7	41.3	47.1	87.8	-40.7
19000.0	180.0	15.7	1.7	48.2	65.6	87.8	-22.2

COMMENT #1: Channel Setting = 600 (Transmit Frequency = 1880.00 MHz)

COMMENT #2: Measurement antenna height = 1 meter for all measurements. This height was found to be worst cases for all spurious emissions (parallel to case of EUT).

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ **APPROVED BY:** _____

Out of Band Emission - Radiated Data Sheet

Maxon America, Inc.
LAU1900 Wireless Local Loop Modem

SERIAL #: FCC #02
DATE: April 1, 1998

PROJECT #: 98-398
POLARIZATION: Horizontal

Freq. (MHz)	EUT Direction (Deg)	Recorded Level (dBuV)	Cable Loss (dB)	Antenna Factor (dBuV/m)	Corrected Level (dBuV/m)	Limit (dBm)	Margin (dB)
1879.5	180.0	92.0	1.5	27.0	120.5	Ref	Ref
3758.0	180.0	41.0	1.5	31.4	73.9	87.8	-13.9
5640.0	180.0	42.0	1.5	34.6	78.1	87.8	-9.7
7520.0	180.0	39.4	1.5	37.2	78.1	87.8	-9.7
9400.0	180.0	34.0	1.5	38.0	73.5	87.8	-14.3
11280.0	180.0	26.7	1.5	38.7	66.9	87.8	-20.9
13160.0	180.0	34.5	1.7	39.9	76.1	87.8	-11.8
15040.0	180.0	30.6	2.0	39.4	72.0	87.8	-15.8
16920.0	180.0	24.7	1.7	41.3	67.7	87.8	-20.1
19000.0	180.0	33.2	1.7	48.2	83.1	87.8	-4.7

COMMENT #1: Channel Setting = 600 (Transmit Frequency = 1880.00 Mhz)

COMMENT #2: Limit based on emission level for vertical polarized antenna (measurement & EUT antennas) as this was worst case emission leevl.

COMMENT #2: Measurement antenna height = 1 meter for all measurements. This height was found to be worst cases for all spurious emissions (parallel to case of EUT).

COMMENT #3: Worst case emissions were for EUT antenna in vertical position. Data is presented for this configuration.

TEST ENGINEER: _____ **APPROVED BY**: _____