



Amendment A to EMC Test Report RP-4736

Tests Performed on an Omnex Control Systems, Inc.

Spread Spectrum Tx Module, Model LPT-900

Radiometrics Document RP-4736A



Amendment Description

This Amendment provides radiated emissions data with and without the plastic enclosure.

Product Detail

FCC ID: **IAPLPT900**

Equipment type: Frequency Hopping Spread Spectrum 900 MHz transmitters

Test Standards

US CFR Title 47, Chapter I, FCC Part 15 Subpart C
FCC Part 15 CFR Title 47: 2001

This report concerns: Original Grant for **Certification for Limited Modular Approval.**
FCC Part 15.247

Tests Performed For

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Test Facility

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Test Date(s) (Month-Day-Year)

June 10, 2002

Document RP-4736A Amendment A

Rev.	Issue Date	Affected Pages	Revised By	Authorized Signature for Revision
0	June 12, 2002			

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report

Equipment Tested (Company, Model, Product Name):

Omnex Control Systems, LPT-900, Spread Spectrum Tx Module

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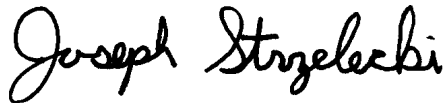
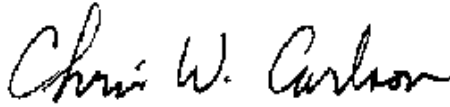
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1 ADMINISTRATIVE DATA

<i>Equipment Under Test:</i> A Omnex Control Systems, Inc., Spread Spectrum Tx Module Model: LPT-900 Serial Number: 12PLT This will be referred to as the EUT in this Report	
<i>Date EUT Received at Radiometrics: (Month-Day-Year)</i> 2-15-02	<i>Test Date(s): (Month-Day-Year)</i> June 10, 2002
<i>Test Report Written By:</i> Joseph Strzelecki Senior EMC Engineer	<i>Test Witnessed By:</i> The tests were not witnessed by Omnex Control Systems, Inc.
<i>Radiometrics' Personnel Responsible for Test:</i> 	<i>Test Report Approved By</i> 
Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

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2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Spread Spectrum Tx Module, Model LPT-900, manufactured by Omnex Control Systems, Inc. The detailed test results are presented in a separate section. The following is a summary of the test results.

This Amendment provides radiated emissions data with and without the plastic enclosure.

Emissions Tests Results

Environmental Phenomena	Frequency Range	FCC Section	RSS-210 Section	Test Result
Spurious Radiated Emissions	30-9300 MHz	15.247 c	6.2.2 (e)	Pass

3 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is a Frequency Hopping Spread Spectrum Transmitter, Model LPT-900, manufactured by Omnex Control Systems, Inc. The EUT was in good working condition during the tests, with no known defects.

4 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations. A 14 cm power cord was used from the batteries to the EUT during the tests.

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	Spread Spectrum Tx Module	E	Omnex Control Systems, Inc.	LPT-900	12PLT

* Type: E = EUT, P = Peripheral, S = Support Equipment

The EUT was tested as a stand-alone device. The wiring was consistent with manufacturer's recommendations. The system was configured for testing in a typical fashion (as it would be normally installed in a product). Power was supplied with a new battery.

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

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5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Test Specifications

Document	Date	Title
FCC CFR Title 47	1999	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ANSI C63.4-1992	1992	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
FCC DA 00-705	2000	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

The test procedures used are in accordance with the FCC DA 00-75, Industry Canada RSS-212 and ANSI document C63.4-1992, (July 17, 1992) "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

6 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

7 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

8 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-05	RMC/Celeritek	Pre-amplifier	MW110G	1001	1.0-12GHz	12 Mo.	11/28/01
AMP-12	MITEQ	Pre-amplifier	AM-1431	530935	0.01-1000MHz	12 Mo.	12/28/01
ANT-03	Tensor	Biconical Antenna	4104	2231	20-200MHz	24 Mo.	08/07/01
ANT-06	EMCO	Log-Periodic Ant.	3146	1248	200-1000MHz	24 mo	08/07/01
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	09/28/00
HPF-01	Solar	High Pass Filter	7930-100	HPF-1	0.15-30MHz	24 Mo.	12/28/00
HPF-02	Microwave Cir.	High Pass Filter	H2G09G02	HPF-2	1.5-11 GHz	24 Mo.	05/29/01
REC-01	Hewlett Packard	Spectrum Analyzer	8566A	2106A02115, 2209A01349	30Hz-22GHz	12 Mo.	06/08/01
REC-03	Anritsu	Spectrum Analyzer	MS2601B	MT94589	0.01-2200MHz	12 Mo.	10/12/01
SCP-01	Tektronix	Oscilloscope	TDS724A	B010117	DC-500MHz	12 Mo.	10/19/01
THM-01	Extech Inst.	Temp/Humid Meter	4465CF	001106557	N/A	12 Mo.	12/26/01

Note: All calibrated equipment is subject to periodic checks.

NCR – No Calibration Required. Device monitored by calibrated equipment. N/A: Not Applicable.

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9 SPURIOUS RADIATED EMISSIONS TEST RESULTS

Radiated emission measurements in the Restricted bands were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. Below 1 GHz, when a radiated emission is detected approaching the specification limit, the measurement of the emission is repeated using a tuned dipole antenna with a Roberts Balun. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz, an Anritsu Spectrum analyzer and a MITEQ AM-1431 amplifier with a 10 dB attenuator connected to the input were used. The out of band emissions and the ambient emissions were below the level of input overload (80 dBuV).

For tests from 1 to 9.3 GHz, an HP8566A spectrum analyzer was used with a Celeritek uWave amplifier. The out of band emissions and the ambient emissions were below the level of input overload (72 dBuV). In addition, a high pass filter was used to reduce the fundamental emission.

Radiated emission measurements are performed with linearly polarized broadband antennas. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded.

Final radiated emissions measurements were performed in the open area test site at a test distance of 3 meters. The entire frequency range from 30 to 9300 MHz was slowly scanned and the emissions in the restricted frequency bands were recorded. Measurements were performed using the peak detector function. The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground. The open area test site used to collect the radiated data is located on 8625 Helmar Road in Newark, Illinois. The open field test site has a metal ground screen. All other tests are performed at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

The device was rotated through three orthogonal axis, as per 13.1.4.1 of ANSI C63.4, during the prescans and during final radiated tests.

9.1 Spurious Radiated Emissions Test Results (Restricted Band)

The following spectrum analyzer settings were used.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

The duty cycle factor is $20 * \text{Log}(18.7/100) = -14.5$ dB; The plot for this is in section 10.3. The peak emissions did not exceed the average by more than 20 dB.

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9.1.1 Radiated Data with EUT Removed from Plastic Case

Manufacturer	Omnex Control Systems	Specification	FCC Part 15 Subpart C & RSS-210
Model	LPT-900	Test Date	3/19/02
Serial Number	12PLT	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; BC = Biconical (ANT-3); LP = Log-Periodic (ANT-6); HN = Horn (ANT-13) P = peak; Q = QP		
Notes	Corr. Factors = Cable Loss – Preamp Gain – Duty Cycle Factor + HP Filter Loss Without case		
	Radiated emission measurements in the Restricted Bands		

Freq. MHz	Meter Reading dBuV	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
		Factor dB	Pol/ Type		EUT	Limit	
2706.6	53.1	31.0	H	-40.4	43.7	54.0	10.3
2745.0	52.0	31.0	H	-40.4	42.6	54.0	11.4
2783.1	52.5	31.1	H	-40.3	43.3	54.0	10.7
3608.8	44.7	33.4	H	-39.5	38.6	54.0	15.4
3660.0	45.2	33.5	H	-39.4	39.3	54.0	14.7
3710.8	45.0	33.7	H	-39.4	39.3	54.0	14.7
4511.0	46.8	34.9	H	-38.7	43.0	54.0	11.0
4575.0	38.8	35.0	H	-38.6	35.2	54.0	18.8
4638.5	39.4	35.0	H	-38.6	35.8	54.0	18.2
5413.2	35.7	36.1	H	-38.4	33.4	54.0	20.6
5490.0	35.8	36.2	H	-38.4	33.6	54.0	20.4
7320.0	40.9	37.8	H	-37.2	41.5	54.0	12.5
7421.5	41.1	38.0	H	-37.2	41.9	54.0	12.1
8119.6	34.5	38.1	H	-36.9	35.7	54.0	18.3
8234.6	34.0	38.2	H	-36.7	35.5	54.0	18.5
8349.3	33.4	38.4	H	-36.2	35.6	54.0	18.4
9021.8	34.4	40.3	H	-34.5	40.2	54.0	13.8
9149.8	33.7	40.0	H	-34.0	39.7	54.0	14.3
9276.9	31.7	39.7	H	-33.5	37.9	54.0	16.1
2706.6	51.0	31.0	V	-40.4	41.6	54.0	12.4
2745.0	51.2	31.0	V	-40.4	41.8	54.0	12.2
3608.8	44.0	33.4	V	-39.5	37.9	54.0	16.1
3660.0	44.0	33.5	V	-39.4	38.1	54.0	15.9
4511.0	39.6	34.9	V	-38.7	35.8	54.0	18.2
4575.0	39.7	35.0	V	-38.6	36.1	54.0	17.9
5413.2	34.7	36.1	V	-38.4	32.4	54.0	21.6
5490.0	36.1	36.2	V	-38.4	33.9	54.0	20.1
7320.0	38.6	37.8	V	-37.2	39.2	54.0	14.8
8119.8	34.5	38.1	V	-36.9	35.7	54.0	18.3
8235.0	32.9	38.2	V	-36.7	34.4	54.0	19.6
9022.1	33.7	40.3	V	-34.5	39.5	54.0	14.5
9150.0	33.0	40.0	V	-34.0	39.0	54.0	15.0

Judgment: Passed by 10.3 dB

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No other emissions were detected in the restricted bands.

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9.1.2 Radiated Data with EUT Installed in Plastic Case.

Freq. MHz	Meter Reading dBuV	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
		Factor dB	Pol/ Type		EUT	Limit	
2706.6	52.4	31.0	H	-40.4	43.0	54.0	11.0
2745.0	51.5	31.0	H	-40.4	42.1	54.0	11.9
2783.1	51.9	31.1	H	-40.3	42.7	54.0	11.3
3608.8	46.2	33.4	H	-39.5	40.1	54.0	13.9
3660.0	46.0	33.5	H	-39.4	40.1	54.0	13.9
3710.8	46.2	33.7	H	-39.4	40.5	54.0	13.5
4511.0	45.3	34.9	H	-38.7	41.5	54.0	12.5
4575.0	37.2	35.0	H	-38.6	33.6	54.0	20.4
4638.5	37.5	35.0	H	-38.6	33.9	54.0	20.1
5413.2	36.2	36.1	H	-38.4	33.9	54.0	20.1
5490.0	34.9	36.2	H	-38.4	32.7	54.0	21.3
7320.0	41.6	37.8	H	-37.2	42.2	54.0	11.8
7421.5	41.9	38.0	H	-37.2	42.7	54.0	11.3
8119.6	34.2	38.1	H	-36.9	35.4	54.0	18.6
8234.6	33.4	38.2	H	-36.7	34.9	54.0	19.1
8349.3	32.4	38.4	H	-36.2	34.6	54.0	19.4
9021.8	34.9	40.3	H	-34.5	40.7	54.0	13.3
9149.8	33.4	40.0	H	-34.0	39.4	54.0	14.6
9276.9	32.1	39.7	H	-33.5	38.3	54.0	15.7
2706.6	54.0	31.0	V	-40.4	44.6	54.0	9.4
2745.0	55.1	31.0	V	-40.4	45.7	54.0	8.3
3608.8	46.7	33.4	V	-39.5	40.6	54.0	13.4
3660.0	46.0	33.5	V	-39.4	40.1	54.0	13.9
4511.0	36.4	34.9	V	-38.7	32.6	54.0	21.4
4575.0	37.1	35.0	V	-38.6	33.5	54.0	20.5
5413.2	33.7	36.1	V	-38.4	31.4	54.0	22.6
5490.0	35.8	36.2	V	-38.4	33.6	54.0	20.4
7320.0	37.9	37.8	V	-37.2	38.5	54.0	15.5
8119.8	34.3	38.1	V	-36.9	35.5	54.0	18.5
8235.0	34.1	38.2	V	-36.7	35.6	54.0	18.4
9022.1	32.7	40.3	V	-34.5	38.5	54.0	15.5
9150.0	31.2	40.0	V	-34.0	37.2	54.0	16.8