

NATIONAL CERTIFICATION LABORATORY

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FCC CLASS II CHANGE REPORT

for

io Wave, Inc.

2100 Washington Blvd., Suite 1001

Arlington, VA 22204

FCC ID: NK4-7039795714

October 28, 1999

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Application Form 731

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NCL PROJ.# IOWAVE-520A

1.0 Introduction

This report has been prepared on behalf of io Wave, Inc., to support the attached Application for Class II Change of a Part 15 Spread Spectrum Transmitter. The Equipment Under Test was the **ioLink4 2.4 Ghz Wireless Modem Transmitter**. A 24-48 VDC input power supply replaces the original 120 VAC power supply on the modem unit only.

Radio-Noise Emissions tests were performed according to **FCC Public Notice 54797, titled "Guidance on Measurements for Direct Sequence SST"**. The measuring equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

Testing was performed at National Certification Laboratory in Ellicott City, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch. FCC acceptance was granted on May 26, 1993.

1.1 Summary

The io Wave, Inc. **ioLink4 2.4 Ghz Wireless Modem Transmitter** continues to comply with the FCC limits (15.247) for a Direct Sequence SST. The electrical change made to the modem unit only is: A 24-48 VDC input power supply replaces the original 120 VAC power supply.

2.0 Description of Equipment Under Test (EUT)

The EUT Features:

- ioLink4 or ioLink 1 Modem units
- +17 to +25 dBm RF Output
- 2412 to 2470 MHz Freq. Range
- 20 MHz Channel Bandwidth
- 2-Channels Duplex Operation
- DQPSK-SS Modulation
- Data Rate - (E1 or T1)

3.0 Test Program

This report contains measurement charts and data as evidence for the following tests performed:

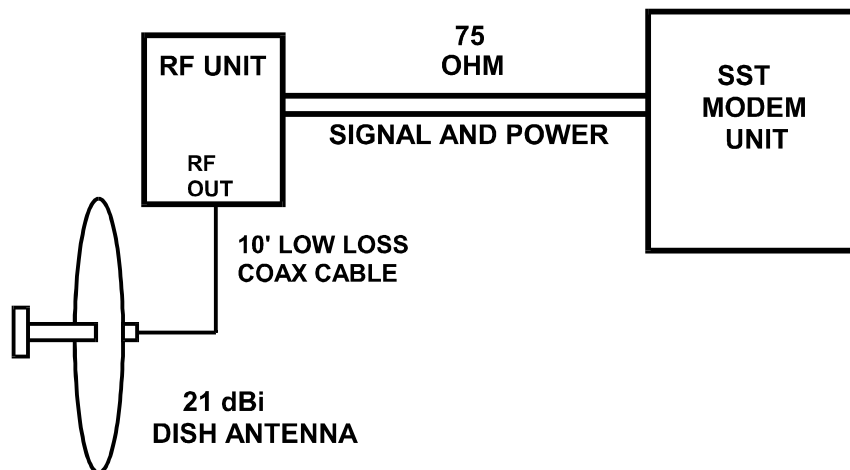
1. (15.207) Power Line Conducted Emissions.

4.0 Test Configuration

The E1 data rate was used for all testing in order to show worse-case emissions.

The EUT was set up on the center of the test table, in a manner which follows the general guidelines of ANSI C63.4, Section 6 "General Operating Conditions and Configurations".

This is described below:



5.0 Conducted Emissions Scheme

The EUT is placed on an 80 cm high 1 X 1.5 m non-conductive table. Power(36 VDC)to the EUT is provided via linear D.C. supply through a Solar Corporation 50 Ω /50 μ H Line Impedance Stabilization Network bonded to a 2.2 X 2 meter horizontal ground plane, and a 2.2 X 2 meter vertical ground plane. The LISN has its AC input supplied from a filtered AC power source. A separate LISN provides AC power to the peripheral equipment. I/O cables are moved about to obtain maximum emissions.

The 50 Ω output of the LISN is connected to the input of the spectrum analyzer and emissions in the frequency range of 450 kHz to 30 MHz are searched. The detector function is set to quasi- peak and the resolution bandwidth is set at 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth for final measurements. All emissions within 20 dB of the limit are recorded in the data tables.

FCC CLASS B CONDUCTED EMISSIONS DATA

EUT: ioLink4

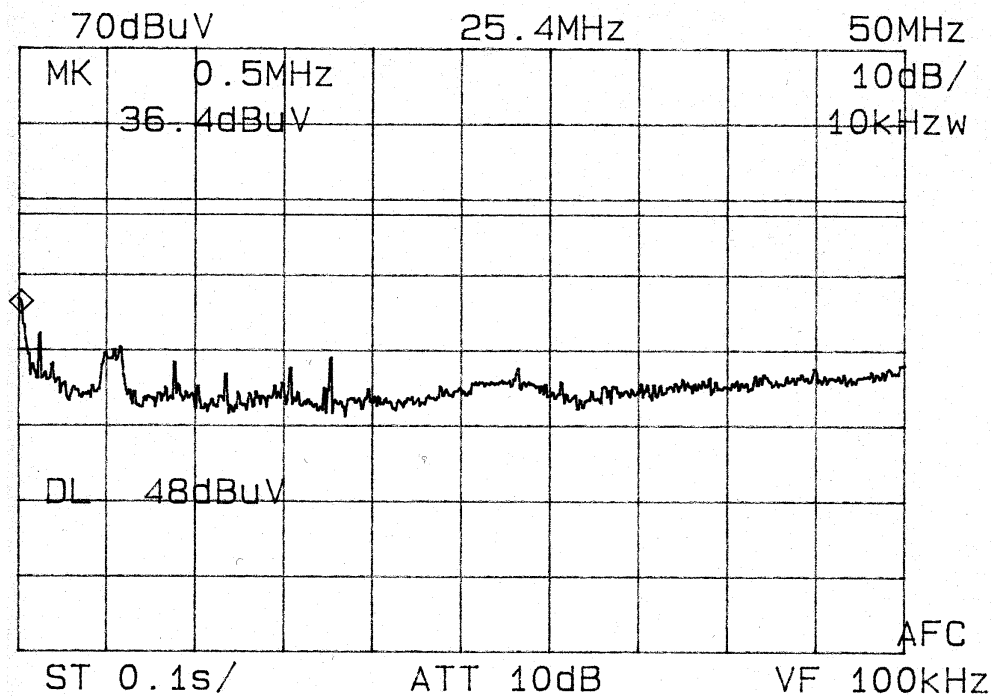
LINE 1 - NEUTRAL

FREQ MHz	VOLTAGE dBuV	VOLTAGE uV	FCC LIMIT dB	MARGIN
.481	36.6	66	250	-11.4
5.92	29.6	29	250	-18.4
12.22	26.8	21	250	-21.2
15.75	26.6	21	250	-21.4
27.54	27.4	22	250	-20.6

LINE 2 - PHASE

FREQ MHz	VOLTAGE dBuV	VOLTAGE uV	FCC LIMIT dB	MARGIN
.481	36.4	66	250	-11.6
1.74	32.2	41	250	-15.8
5.93	30.2	32	250	-17.8
12.22	26.8	21	250	-21.2
28.68	27.6	22	250	-20.4

ioLink4 - A.C. LINE-CONDUCTED EMISSIONS - L1



ioLink4 - A.C. LINE-CONDUCTED EMISSIONS - L2

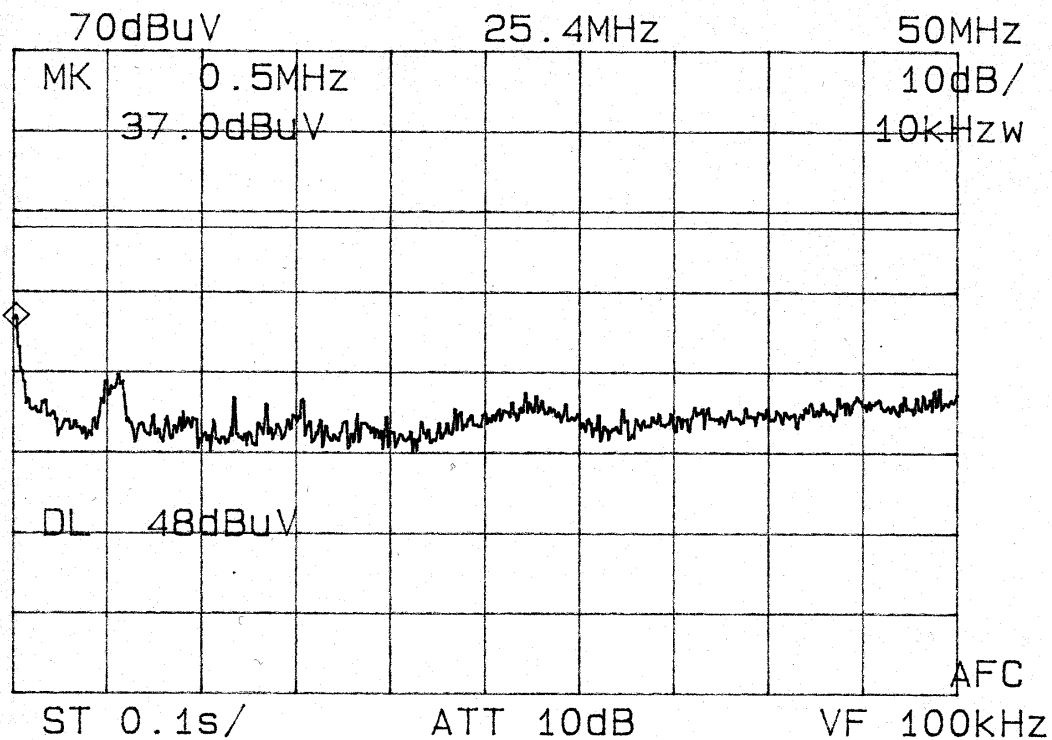


Table 1

EUT Accessories

Parabolic Dish Antenna - Comsat Model P-24A24N-1 (2.3-2.5 GHz)

- S/N: 224576

- Gain = 21 dBi

Table 2

Interface Cables Used

7 ft., dual 75 ohm coaxial cables are used to connect the indoor modem unit to the outside RF transmitter unit.

A 10 ft., 1/4" semirigid 50 ohm coax line is used to connect the output of the RF unit to the dish antenna.

Table 3

Measurement Equipment Used

The following equipment is used to perform measurements:

HP 435A RF Peak Power Meter	- Serial No. 1362016
EMCO Model 3110 Biconical Antenna	- Serial No. 1619
Antenna Research MWH-1825B Horn Antenna	- Serial No. 1005
EMCO Model 3115 Ridged Horn Antenna	- Serial No. 3007
HP 8348A Preamplifier	- Serial No. 197-2564A
Solar 8012-50-R-24-BNC LISN	- Serial No. 924867
Solar 8012-50-R-24-BNC LISN	- Serial No. 927230
Tektronix R3272 Spectrum Analyzer	- Serial No. 6-95-1124
4 Meter Antenna Mast	
Motorized Turntable	
Heliac FSJ1-50A 1/4" Superflex Coax Cable (12 Ft.)	