

NATIONAL CERTIFICATION LABORATORY

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FCC REPORT OF RADIO INTERFERENCE

for

**Microhard Systems Inc
#209 - 12 Manning Close N.E.
Calgary, Alberta Canada**

FCC ID: NS998P001X01

July 16, 1998

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NCL PROJ.# MICROHARD-460

1.0 Introduction

This report has been prepared on behalf of Microhard Systems, Inc., to support the attached Application for Certification of a Part 15 Spread Spectrum Transmitter. The Equipment Under Test was the **Model MRX-900 Wireless Modem Transceiver**.

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 Microhard Systems, Inc. **Model MRX-900 Wireless Modem Transceiver** complies with the FCC limits (15.247) for a Frequency Hopping SST.

2.0 Description of Equipment Under Test (EUT)

The EUT Features:

Reverse TNC Antenna Connector per 15.203
+ 30 dBm RF Output Max.
902 - 928 MHz Freq. Range
350 kHz 20 dB Emission Bandwidth
64 Hopping Channels
400 Khz Channel Separation
172.8 kbps Data Rate (Radio Link)
115.2 kbps Max Data Rate (DCE)

3.0 Test Program

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

1. (15.247 b) Peak RF output power.
2. (15.247 c) Field strength of harmonics and spurious out-of-band emissions.
3. (15.247 c) RF Antenna Conducted of harmonics and spurious out-of-band emissions.
4. (15.247 a) 20 dB Emission Bandwidth.
5. (15.207) Power Line Conducted Emissions.

4.0 Test Configuration

RF antenna conducted output tests such as Bandwidth, Spurious/Harmonics, and Power output, were taken with the transmitter antenna connector feeding directly into the spectrum analyzer via external 30 dB attenuator. The analyzer's internal attenuator was adusted to prevent overloading of the front end.

Field strength measurements were taken with the transmitter feeding a yagi, or omni antenna aimed at the receiving measurement antenna. Testing was performed using the highest gain antenna from each design family (yagi, omni) with the power setting at 1 watt for the omni antenna, and 100 mW for the higher gain yagi.

A list of all possible antennas that will be sold with the MRX-900 Wireless Modem is included in Table 1 of this report.

PEAK POWER TEST RESULTS

Limit: 1.0 watts (30 dBm)

Condition: Transmitter is set to a single FM modulated channel

Readings from spectrum analyzer with 1 MHz Resolution BW setting:

Channel 1:	902.5 MHz	-	+29.4 dBm
Channel 32:	915.0 MHz	-	+29.4 dBm
Channel 64:	927.8 MHz	-	+28.8 dBm

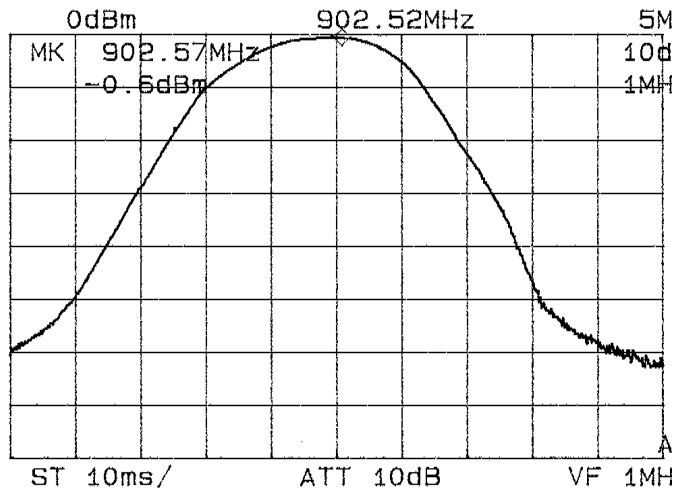
SEE FOLLOWING 3 PLOTS OF MODULATED CARRIER

PEAK POWER OUTPUT AT ANTENNA TERMINAL - SET CHANNEL 1

MODULATED

5.0 MHZ SPAN

1 MHZ RES. BW

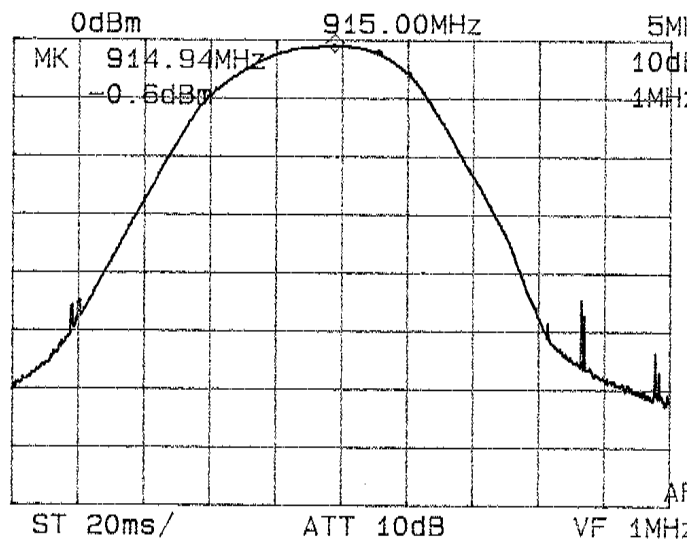


PEAK POWER OUTPUT AT ANTENNA TERMINAL - SET CHANNEL 32

MODULATED

5.0 MHZ SPAN

1 MHZ RES. BW

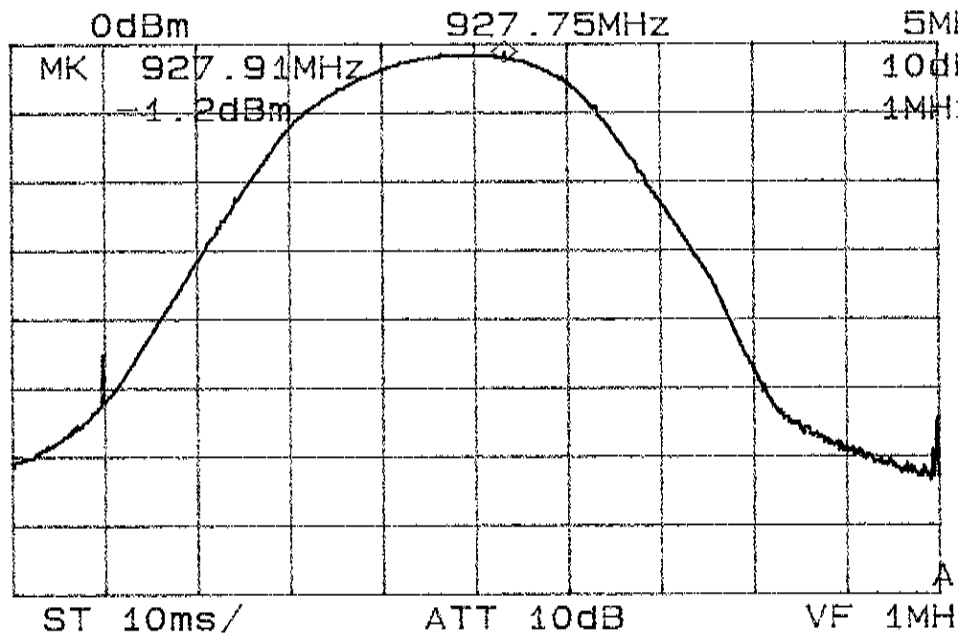


PEAK POWER OUTPUT AT ANTENNA TERMINAL - SET CHANNEL 64

MODULATED

5.0 MHz SPAN

1 MHz RES. BW



NOTE: 30 dB
EXT. ATTN.

20 dB EMISSION BANDWIDTH

Maximum 20 dB BW: 0.500 MHz

RBW Setting on S.A.: 10 kHz

Condition: Transmitter is set to a single FM modulated channel

Readings from spectrum analyzer:

Channel 1: 902.5 MHz - 352 kHz

Channel 32: 915.0 MHz - 368 kHz

Channel 64: 927.8 MHz - 348 kHz

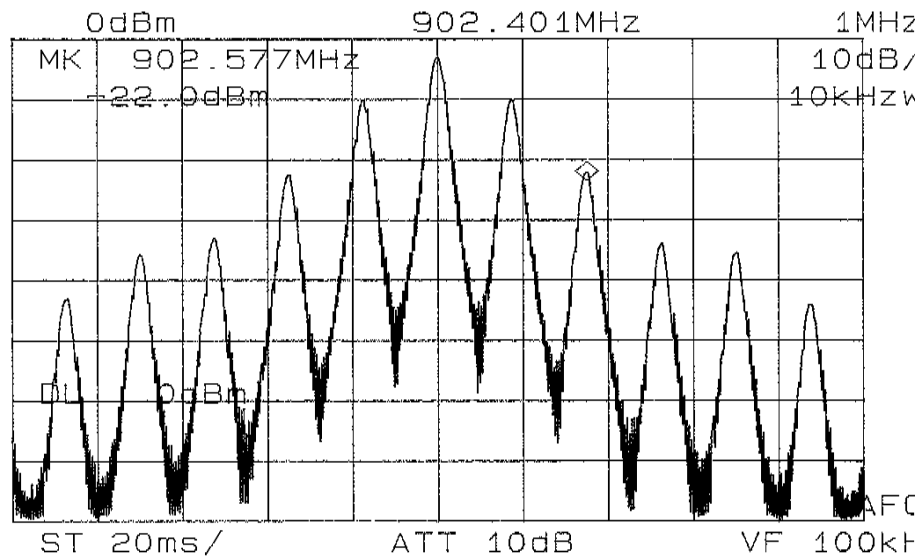
SEE FOLLOWING PLOT 3 PLOTS OF MODULATED CARRIER

20 DB BANDWIDTH AT ANTENNA TERMINAL - SET CHANNEL 1

MODULATED

1.0 MHZ SPAN

10 KHZ RES. BW

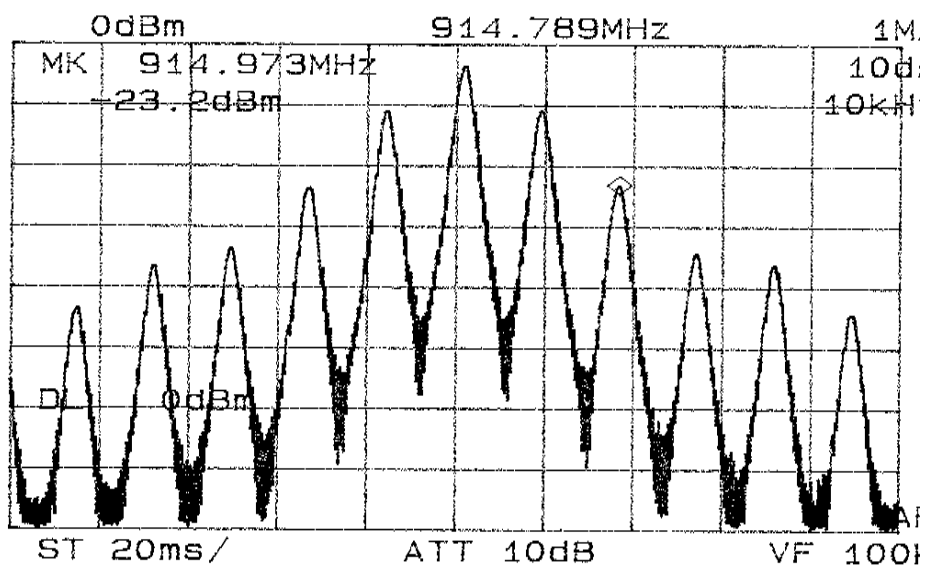


20 DB BANDWIDTH AT ANTENNA TERMINAL - SET CHANNEL 32

MODULATED

1.0 MHZ SPAN

10 KHZ RES. BW



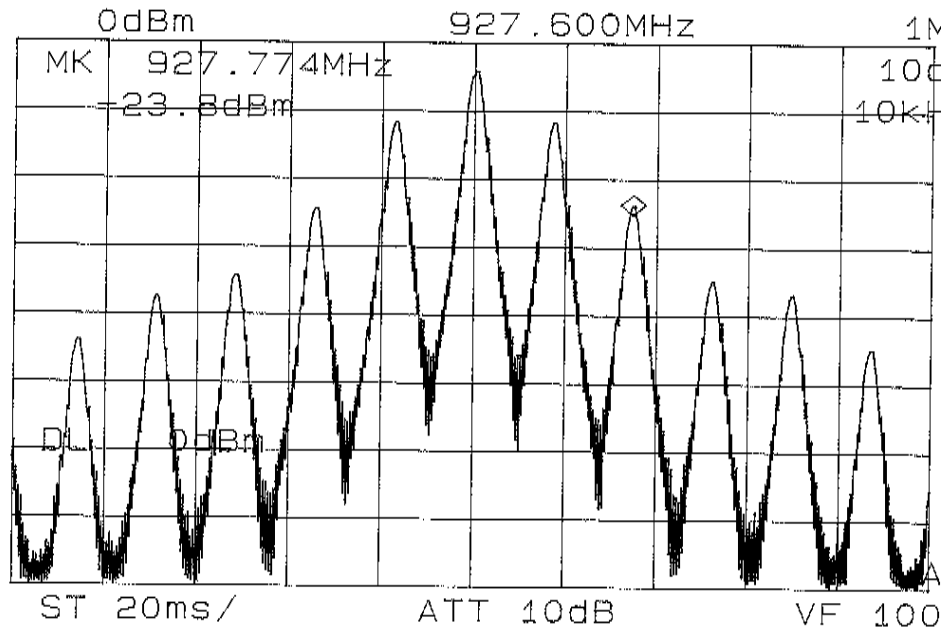
NOTE: 30 dB
EXT. ATTN.

20 DB BANDWIDTH AT ANTENNA TERMINAL - SET CHANNEL 64

MODULATED

1.0 MHZ SPAN

10 KHZ RES. BW



NOTE: 30 dB
EXT. ATTN.

RF ANTENNA CONDUCTED SPURIOUS/HARMONICS EMISSIONS

Limit: 20 dB below Carrier Level Measured with 100 kHz RBW
RBW Setting on S.A.: 100 kHz

Condition: Transmitter is set to a single FM modulated channel.
RF power = 30 dBm

Three separate Measurements are performed to show harmonic and spurious emissions generated with the transmitter tuned to low, middle, and high parts of the spectral range.

SEE FOLLOWING 3 PLOTS & DATA TABLES

FCC PART 15.247(c) - CONDUCTED SPURIOUS EMISSIONS

Frequency of Carrier = 902.5 MHz

Limit = 20 dBc

Condition: Transmitter is set to a single FM modulated channel.

TEST RESULTS

LIMIT: -20 dB FROM PEAK CARRIER

<u>COMPONENT</u>	<u>FREQUENCY (MHZ)</u>	<u>RESULT (dB FROM PEAK)</u>
HARMONIC	1805.00	- 54.0
HARMONIC	2707.50	- 58.0
HARMONIC	3610.00	- 70.0
HARMONIC	4512.50	- 73.0
HARMONIC	5415.00	- 74.0
HARMONIC	6317.50	- 74.0
HARMONIC	7220.00	- 74.0
HARMONIC	8122.50	- 74.0
HARMONIC	9025.00	- 74.0