January 24, 2000

Mr. Jeff Czumak
Federal Communications Commission
Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

Michael J. Murphy
75 Northeastern Blvd.
Nashua, NH 03062
(603) 668-8549 FAX (603) 880-6965

Attention: Jeff Czumak

Re: Answers to questions from Original E-mail of 07/06/99
Re-transmitted after Dissmisal and Set Aside 01/12/00
Correspondance Reference Number: 8585
Equipment Class: DSS-Part 15 Spread Spectrum Transmitter
FCC ID: H25DSS900TX
731 Confirmation Number EA94395
Applicant: DTC

DTC has collected additional data on H25DSS900TX in order to satisfy all seven questions on the referenced E-mail.

1. Band edge plots have been submitted which show that the spectral signature is greater than - 40 dBc at the band edges, when the transmitter is set to the lowest and highest frequency. This meets the - 20 dBc minimum of 15.247c.

2. The manufacturers complete processing gain data for the transmitter / receiver combination has been included.

3. The peak output power was re-measured and has been submitted according to the guidelines of fcc97114.txt APPENDIX C; **Guidance on Measurements for Direct Sequence Spread Spectrum Systems.**

4. Retlif Laboratories has submitted additional data highlighting Restricted Band emissions.

5. The two referenced antennas are used on the receive side only. This transmitter is equipped with a single integral patch antenna.

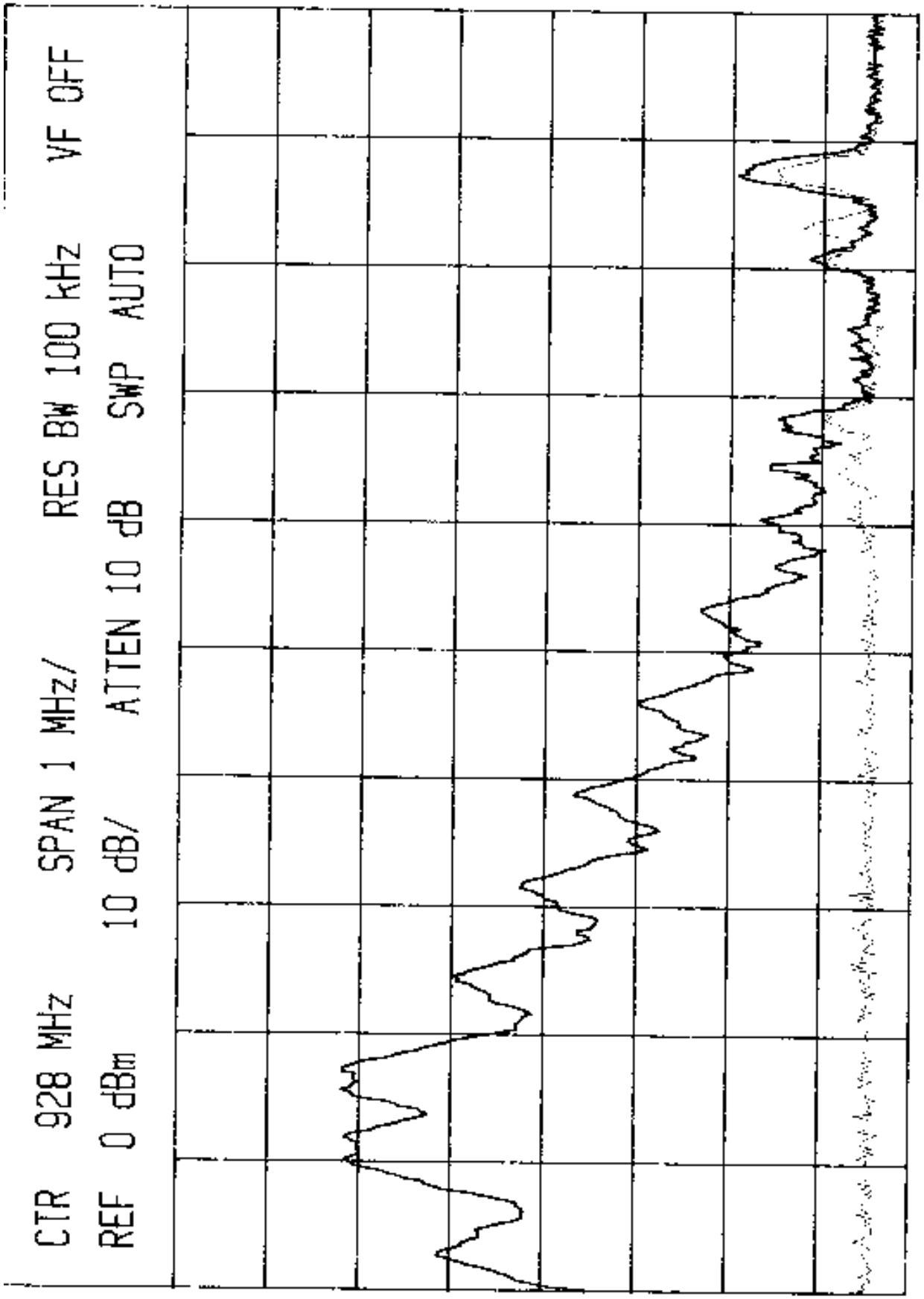
6. The receiver FCC ID is I8WWRM91-50.

7. I have spoken with Mr. Errol Chang concerning the SAR report, which is in order.

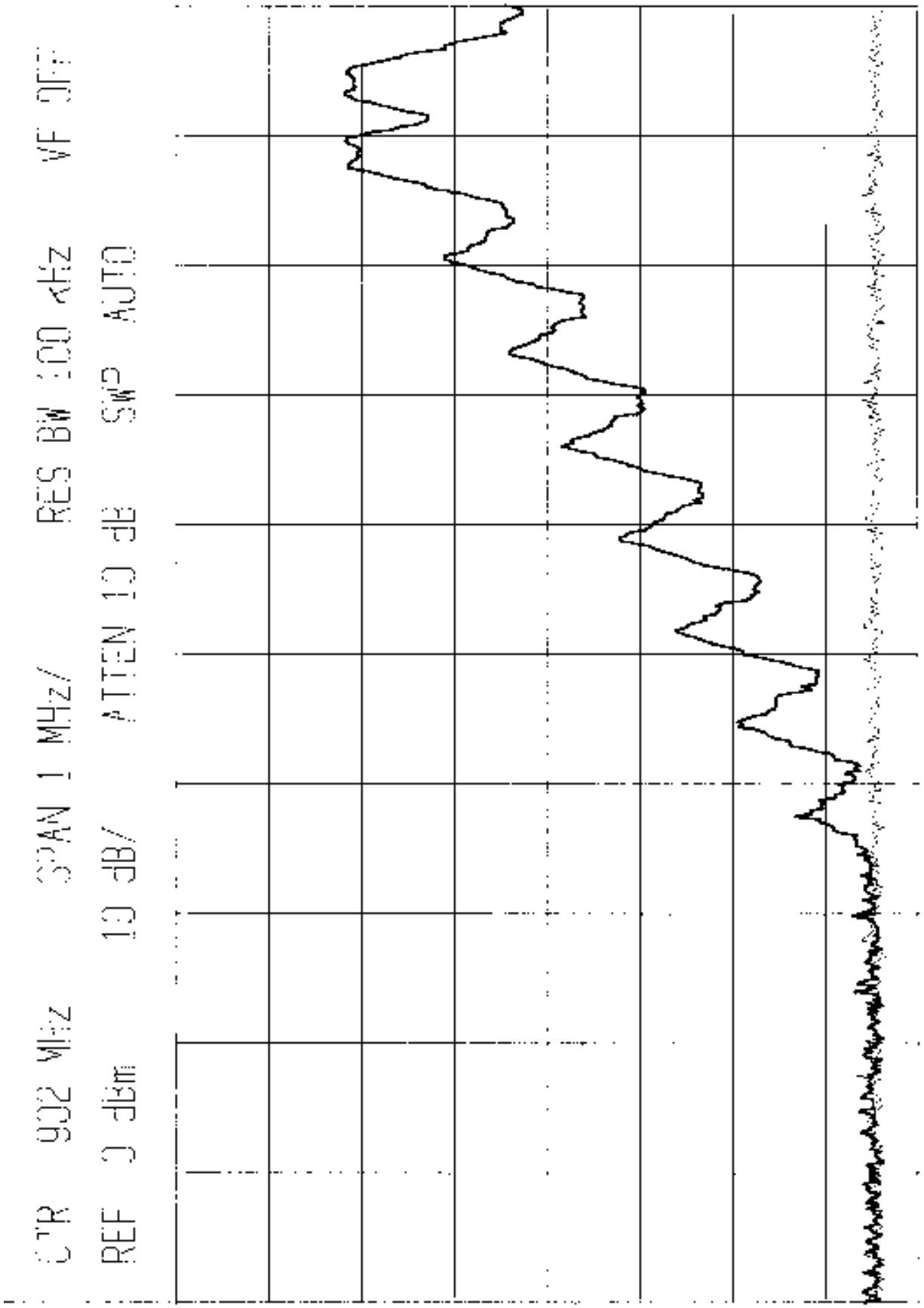
Best Regards,

Michael J. Murphy
Electronics Engineer
DTC Communications, Inc.
mmurphy@dtccom.com

Bandedge Spectral High Channel - 924 MHz



Bandedge Spectral Low Channel - 905 MHz



Processing Gain in the WRM91 Receiver

FCC Part 15.247, amended June 14, 1990, requires that direct sequence spread spectrum (DS/SS) receivers exhibit at least 10 dB processing gain. Processing gain in DS/SS systems is defined as the difference between receiver input signal to noise ratio and post-correlation signal to noise ratio. The Rules state that processing gain shall be determined from the ratio of the signal to noise ratio with the system spreading code turned off and the signal to noise ratio with the system spreading code turned on, as measured at the demodulated output of the receiver." In many systems, including the subject WRM91 receiver, the signal to noise ratio cannot be measured with the spreading code "turned off" because the code is permanently programmed into a digital FIR filter. If the FIR filter clock is disabled to "turn off" the spreading code, the FIR filter will be disabled, making any measurement of signal to noise ratio impossible.

As an alternative, measurement a related quantity -- jamming margin -- provides a convenient substitute measurement. Jamming margin is generally considered a valid substitute measurement of realized processing gain. Jamming margin is often a function of the nature of the jamming signal. The use of a CW jammer for jamming margin measurements is simple and straightforward and is meaningful and repeatable. Using a Jammer and measuring system bit error rate (BER) as a function of the signal interference (S/I) ratio or its converse, the jam to signal (J/S) ratio, provides an indication of a receiver's ability to resist jamming.

Digital communications systems exhibit a BER threshold effect: They perform well in the presence of noise or jamming up to a certain point, then BER precipitously deteriorates. The theoretical 10-5 BER threshold for BPSK systems is about 9.6 dB. Most commercial systems, for reasons relating to practical and economic aspects of commercial-quality circuit realization, exhibit a 10-5 BER at approximately 12 to 14 dB S/I. Using this as a standard, a spread spectrum system that exhibits a 10-5 BER at an input S/I ratio in the range of 2 to 4 dB has probably achieved 10 dB jamming margin and, by inference, 10 dB of processing gain.

GAMBETTE INC. TRADE SECRET INFORMATION

Measurements of WRM91 receiver jamming margin were made using a Hewlett Packard 8656B UHF synthesizer as a jammer The results are shown in the tables and graphs on the following pages. The RMS powers of the jammer and the signal were measured precisely for the tests using a, Hewlett Packard Model 438A RF power meter which is has 0.01 dB resolution, It can be seen that the minimum 10 dB margin requirement is met or exceeded at all frequencies, Out-of-band rejection is very exceptionally high, requiring a jamming (blocking) signal of -2 dBm or so to Jam the desired signal (-20 dBrn blocking is considered excellent for most commercial or industrial receivers),

We have submitted data on the CW Jamming margin of the WRM91 receiver in-band and out-of-band in order to demonstrate that its a very robust receiver. We submit the following data and information as evidence that the WRM91 receiver does indeed possess at least 10 dB processing gain:

1) The spreading ratio of the WRM91 transmitter is 14 (18.6 dB), thus 10 dB is theoretically achievable.

2) The system exhibits less than 10-5 BER at 2.1 dB S/I typical, 3.8 dB worst case with a CW jammer, This is indicative of a 11.9 dB typical and 10.2 dB worst case assuming that 14 dB S/N is necessary at the demodulator for 10-5 BER.

3) The receiver is a well-designed, industrial-quality single conversion superheterodyne design. It uses a high-intercept-point RF preamp and mixer, a high rejection SAW IF filter, insuring that it has no significant response (as is demonstrated by the out-of-band CW interference measurements) to out-of-band signals.

4) The receiver employs a differential demodulator with a 2:1 input/output symbol ratio followed by a 37-tap FIR filter correlator for a net 74:1 input output symbol ratio. It also features a post-correlation integrate-and-dump bit decision circuit (as opposed to simple threshold detection) to insure that as much as possible of the post-processed energy is recovered and utilized in making the bit decision,

5) The system's 74-elernent spreading code was designed by computer and was chosen for its random spectral distribution properties, 1/0 code balance, and excellent even and odd correlation characteristics.

GAMBATTE INC TRADE SECRET INFORMATION

GAMBATTE, INC TRADE SECRET INFORMATION

We submit that our CW jamming margin measurements are a valid demonstration of the WRM91 receiver's having met the 10 dB processing gain requirement of FCC Part 15.247, as amended June 14, 1990.

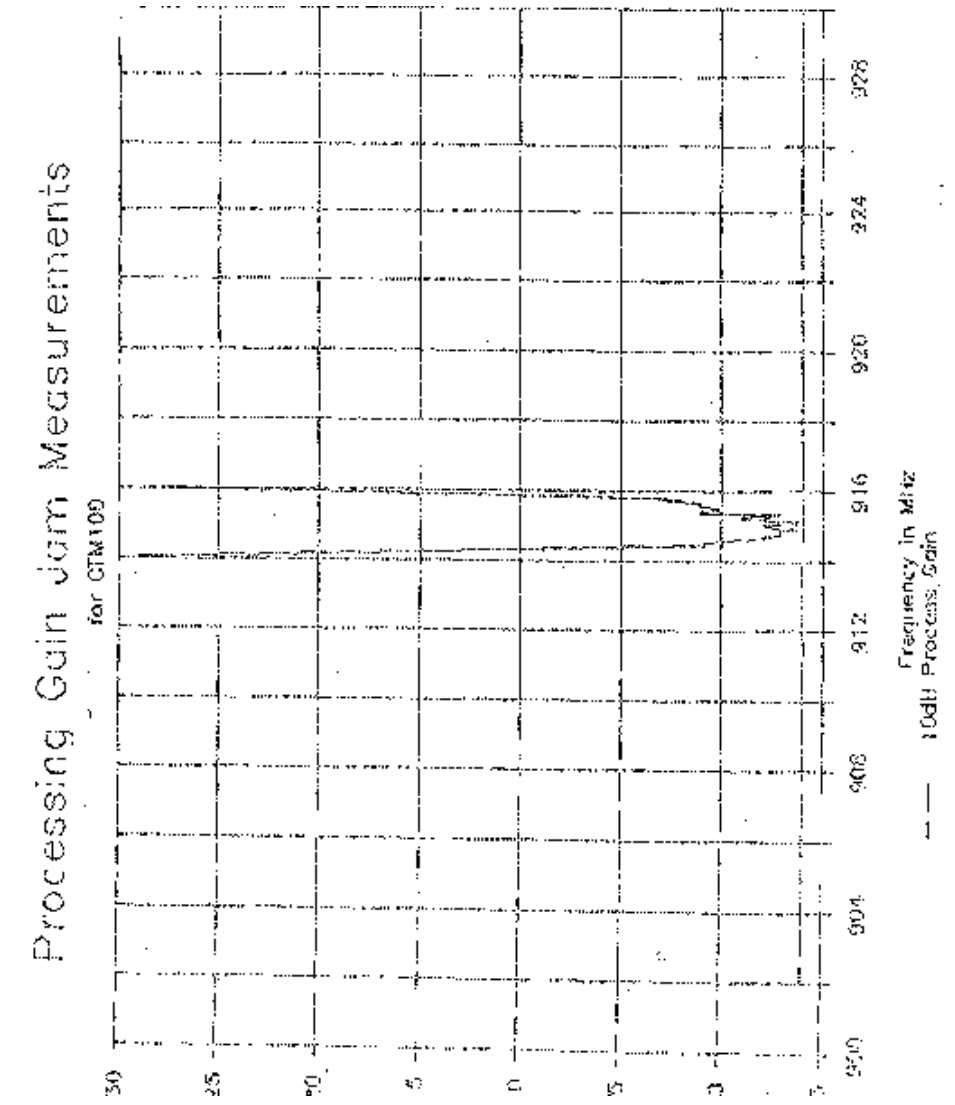
Respectfully submitted,

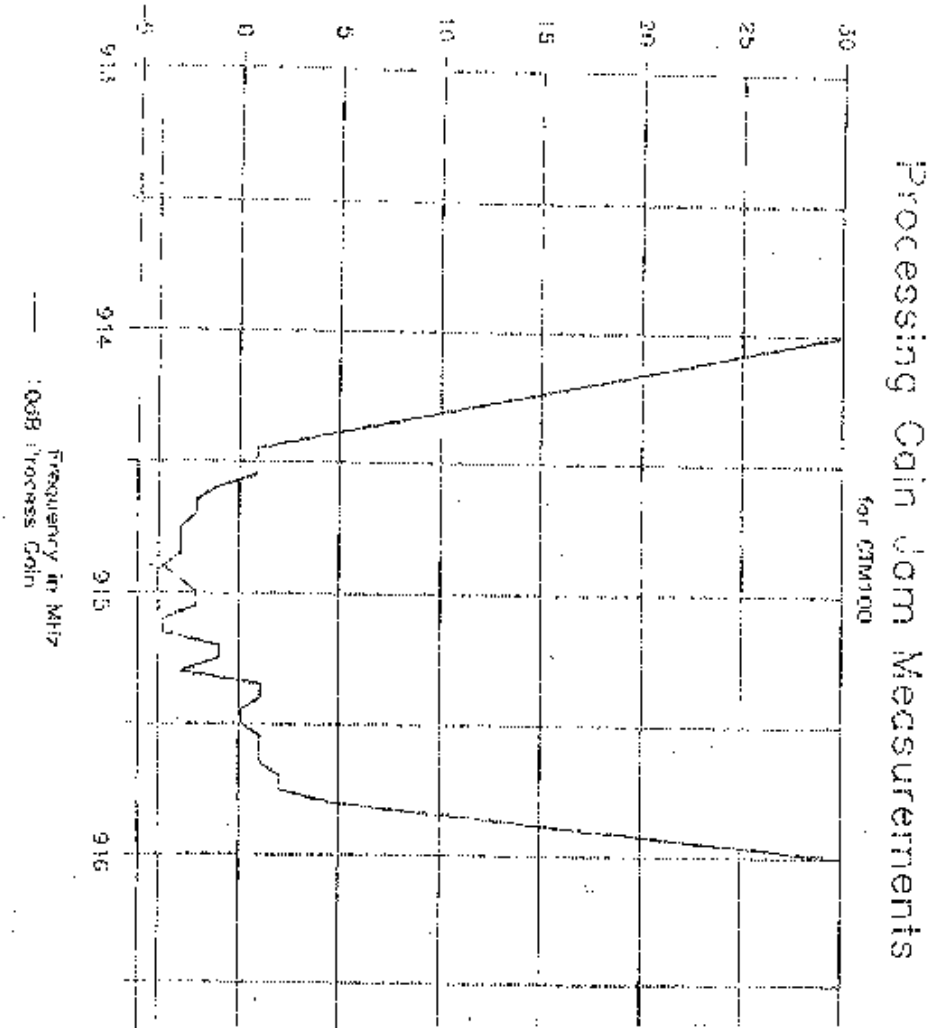
P. Stuckey McIntosh
Chairman
Gambatte Digital Wireless

JAMMING MEASUREMENTS OF THE WRM91 SYSTEM

Frequency(MHz)	CW Jammer Level (Dbm Relative to Signal)
900	30
902	30
903	30
904	30
905	30
906	30
907	30
908	30
909	30
910	30
911	30
912	30
913	30
914	30
914.4	3.9
914.45	0.9
914.5	0.9
914.55	0.9
914.5	-1.1
914.65	-2.1
914.7	-2.1
914.75	-2.9
914.3	-2.9
914.85	-2.9
914.9	-3.8
914.95	-2.9
9113	-2.1
915-05	-2.1
915.1	-3.8
915.15	-3.8
915.2	-1
915.25	-1
915.3	-2.9

915.35	1.1
915.4	1.1
915.45	0.1
915.5	0.1
915.55	1.1
915.6	1.1
915.65	1.1
915.7	2.1
915.75	2.1
915.8	4.7
916	30
917	30
918	30
919	30
920	30
921	30
922	30
923	30
924	30
925	30
926	30
927	30
918	30
930	30

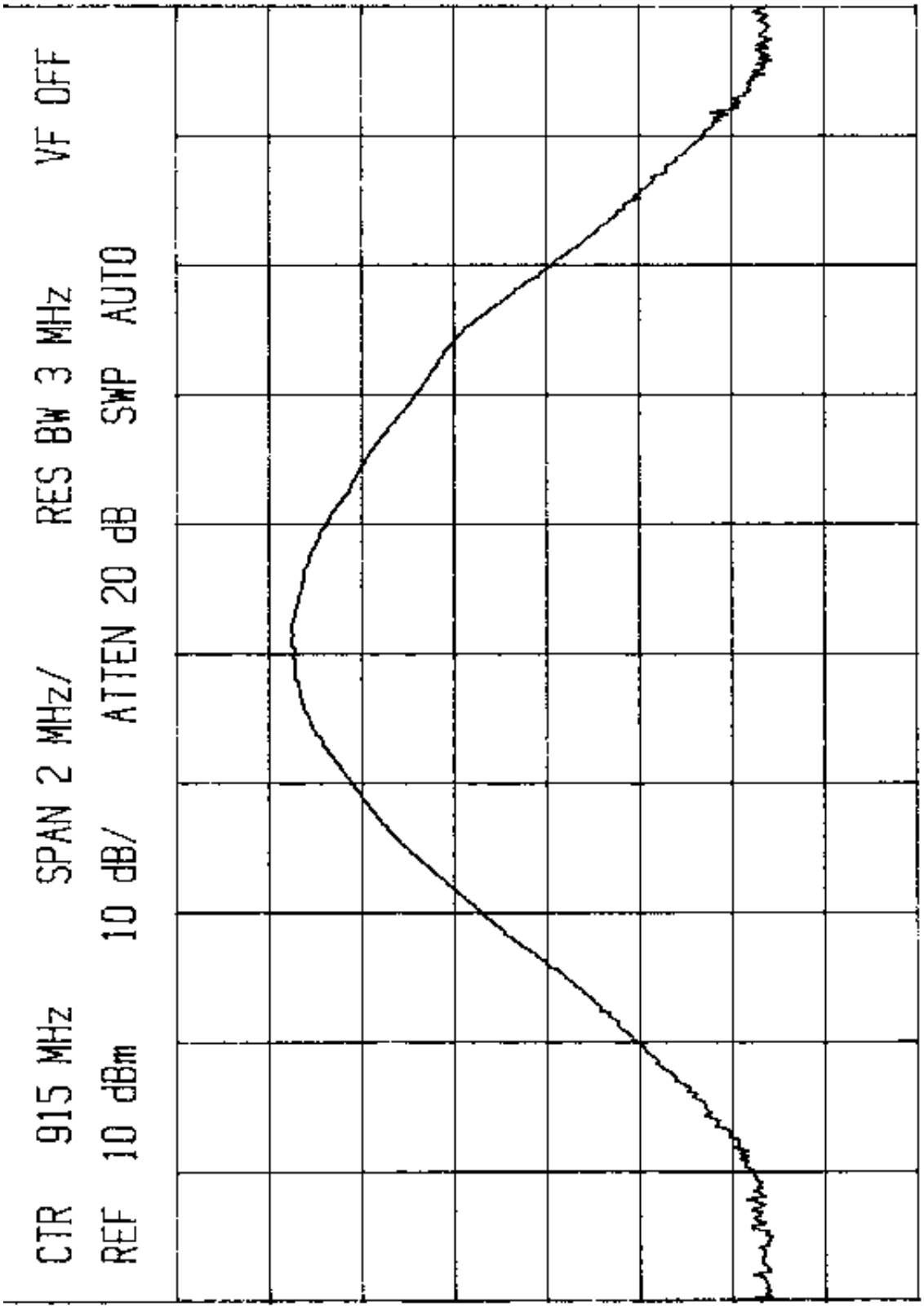

Processing Gain dam Measurements
for CTM109
30
25
20
15
10
5
0
-5
-10
900
904
908
912
916
920
924
928
Frequency in MHz
10dB Processs Gain



This document. contains Trade Secret and or Company Confidential information. We request that the contents of this correspondence and A related correspondence be withheld from public inspection as provided under Section 0.457, as requested in the application for Part 15 intentional spread spectrum radiator certification for FCC ID I18WWRM91-50.

GAMBATTE INC TRADE SECRET INFORMATION

Peak Power Measurement – 915 MHz



Restricted Band Data

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

TEST METHOD: Radiated Spurious Emissions to the 10th Harmonic and Restricted Bands

CUSTOMER: DTC Communications, Inc. | **JOB NO**: 3400N

TEST SAMPLE: Direct Sequence Spread Spectrum Transmitter

MODEL NO: DSS900 TX | **SERIAL NO**: AD 524

TEST SPECIFICATION: 47CFR Part 15, Section 15.247

OPERATING MODE: Transmitting a 915MHz Signal

TECHNICIAN: M. Hippert | **DATE**: 2-10-99

NOTES: Detector Function: Quasi-Peak below 1000MHz, Average above 1000MHz. Testing was performed at 3 meters and emissions evaluated for all three axes (XYZ) of the EUT.

OPERATING FREQUENCY	MEASURED FREQUENCY	RESTRICTED FREQUENCY RANGES	METER READING	CORRECTION FACTOR	CORRECTED READING	RESTRICTED LIMIT	SPURIOUS LIMIT
MHz	MHz	MHz	dBuV	dB	dBuV/m	dBuV/m	dBuV/m
915	—	608-614	—	—	—	—	—
	915	—	**90.5**	**12.5**	**103**	**N/A**	**N/A**
	—	960-1240 1300-1427 1435-1626.5 1645.5-1646.5 1660-1710 1718.8-1722.2	—	—	—	—	—
	1830	—	**22.1**	**26**	**48.1**	**N/A**	**83**
	—	2200-2300 2310-2390 2483.5-2500	—	—	—	—	—
	2745	**2655-3267**	**18.6**	**29**	**47.6**	**54**	**54**
	—	3332-3339 3345.8-3358	—	—	—	—	—
	3660	**3600-4400**	**N/A**	**31**	**N/A**	**54**	**54**
	4575	**4500-5150**	**N/A**	**33**	**N/A**	**54**	**54**
	—	5350-5460	—	—	—	—	—
	5490	—	**N/A**	**34**	**N/A**	**54**	**54**
	7320	**7250-7750**	**N/A**	**35**	**N/A**	**54**	**54**
	8235	**8025-8500**	**N/A**	**37**	**N/A**	**54**	**54**
	9150	**9000-9200**	**N/A**	**38**	**N/A**	**54**	**54**

The worst case position and highest emission levels are recorded on this data sheet. Emissions shown on this data sheet were observed with the EUT in "Y" position -- standing, long dimension up, with EUT patch antenna facing measuring antenna. Antenna position was Vertical, 1 meter height. Fundamental frequency level recorded for reference to establish spurious limits at 20dB down. Corrected readings equal meter reading and correction factor.

DATA SHEET 1 of 1 **R-3400N**