



**M. Flom Associates, Inc. - Global Compliance Center**

3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176  
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Date: April 23, 1999

Federal Communications Commission  
EQUIPMENT APPROVAL SERVICES  
P.O. Box 358315  
Pittsburgh, PA 15251-5315

Attention: Authorization & Evaluation Division

Applicant: Novatel Wireless Technologies Ltd.  
Equipment: NRM-6831 "Merlin"  
FCC ID: NBZNRM-6831  
Model: NRM-6831 "Merlin"  
FORM 731 Confirmation Number:

Gentlemen:

As per instructions received, enclosed herewith please find completed Remittance Advice Form 159 for the referenced equipment, bearing original signature, and the application having been electronically filed.

Sincerely yours,

A handwritten signature in black ink that reads 'Morton Flom, P. Eng.' The signature is written in a cursive, slightly slanted style.

Morton Flom, P. Eng.

enclosure(s)  
CERTIFIED MAIL, R.R.R.  
cc: Visa  
cc: File  
MF/cvr

**MFA** **M. Flom Associates, Inc. - Global Compliance Center**  
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Equipment: NRM-6831 "Merlin"  
FCC ID: NBZNRM-6831  
FCC Rules: 22H, 1.1310 (MPE), Confidentiality

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

Filing fees are attached.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,



Morton Flom, P. Eng.

enclosure(s)  
CERTIFIED MAIL, R.R.R.

cc: Applicant  
MF/cvr

LIST OF EXHIBITS  
(FCC **CERTIFICATION** (CELLULAR TRANSMITTERS) - REVISED 9/28/98)

APPLICANT: Novatel Wireless Technologies Ltd.

FCC ID: NBZNRM-6831

BY APPLICANT:

1. LETTER OF AUTHORIZATION
2. IDENTIFICATION DRAWINGS, 2.1033(c)(11)
  - \_\_\_ LABEL
  - \_\_\_ LOCATION OF LABEL
  - \_\_\_ COMPLIANCE STATEMENT
  - \_\_\_ LOCATION OF COMPLIANCE STATEMENT
3. PHOTOGRAPHS, 2.1033(c)(12)
4. CONFIDENTIALITY REQUEST: 0.457 and 0.459
5. DOCUMENTATION: 2.1033(c)
  - (3) INSTALLATION/OPERATING MANUAL
  - (9) TUNE-UP/ALIGNMENT PROCEDURE
  - (10) SCHEMATIC DIAGRAM
  - (10) CIRCUIT DESCRIPTION
6. ATTESTATION: ESN: Section 22.919
7. ATTESTATION: OET: Section 22.933

BY M.F.A. INC.

- A. TESTIMONIAL & STATEMENT OF CERTIFICATION
- B. STATEMENT OF QUALIFICATIONS



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Sub-part  
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: NBZNRM-6831

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

April 23, 1999

SUPERVISED BY:

A handwritten signature in black ink that reads 'Morton Flom, P. Eng.' The signature is written in a cursive, flowing style.

Morton Flom, P. Eng.

THE APPLICANT HAS BEEN CAUTIONED AS TO THE FOLLOWING:

15.21 INFORMATION TO USER.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) SPECIAL ACCESSORIES.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.


Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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2.1033(c)	General Information Required	2
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	Standard Test Conditions and Engineering Practices	6
2.1046	Carrier Output Power (Conducted)	7
2.1049(c)(1)	Emission Masks (Occupied Bandwidth)	9
2.1055(a)(1)	Frequency Stability (Temperature Variation)	23
2.1055(b)(1)	Frequency Stability (Voltage Variation)	26

PAGE NO. 1 of 26.

Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

- a) TEST REPORT
- b) Laboratory: M. Flom Associates, Inc.  
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107  
(Canada: IC 2044) Chandler, AZ 85225
- c) Report Number: d9940068
- d) Client: Novatel Wireless Technologies Ltd.  
6715 - 8th St., N.E., Suite 200  
Calgary, AB T2E 7H7 Canada
- e) Identification: NRM-6831 "Merlin"  
FCC ID: NBZNRM-6831  
Description: Cellular Data Packet Radio Module
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: April 23, 1999  
EUT Received: April 6, 1999
- h, j, k): As indicated in individual tests.
- i) Sampling method: No sampling procedure used.
- l) Uncertainty: In accordance with MFA internal quality manual.
- m) Supervised by:   
Morton Flom, P. Eng.
- n) Results: The results presented in this report relate only to the item tested.
- o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

PAGE NO. 2 of 26.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

IN ACCORDANCE WITH FCC RULES AND REGULATIONS,  
VOLUME II, PART 2 AND TO

22H, 1.1310 (MPE), Confidentiality

Sub-part 2.1033

(c) (1): NAME AND ADDRESS OF APPLICANT:

Novatel Wireless Technologies Ltd.  
6715 - 8th St., N.E., Suite 200  
Calgary, AB T2E 7H7 Canada

MANUFACTURER:

Sanmina Canada ULC  
675 - 9<sup>th</sup> Street NE  
Calgary, AB  
Canada T2E 8R9

(c) (2): FCC ID: NBZNRM-6831

MODEL NO: NRM-6831 "Merlin"

(c) (3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c) (4): TYPE OF EMISSION: 40K0F2D

(c) (5): FREQUENCY RANGE, MHz: 824.04 to 848.97

(c) (6): POWER RATING, Watts: 0.006 to 0.6  
x Switchable      Variable      N/A

(c) (7): MAXIMUM POWER RATING, Watts: 0.6



PAGE NO. 3 of 26.

Subpart 2.1033 (continued)

(c) (8): VOLTAGES & CURRENTS IN ALL ELEMENTS IN FINAL R. F. STAGE,  
INCLUDING FINAL TRANSISTOR OR SOLID STATE DEVICE:

COLLECTOR CURRENT, A = per manual  
COLLECTOR VOLTAGE, Vdc = per manual  
SUPPLY VOLTAGE, Vac = 3.6

(c) (9): TUNE-UP PROCEDURE:

PLEASE SEE ATTACHED EXHIBITS

(c) (10): CIRCUIT DIAGRAM/CIRCUIT DESCRIPTION:

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

PLEASE SEE ATTACHED EXHIBITS

(c) (11): LABEL INFORMATION:

PLEASE SEE ATTACHED EXHIBITS

(c) (12): PHOTOGRAPHS:

PLEASE SEE ATTACHED EXHIBITS

(c) (13): DIGITAL MODULATION DESCRIPTION:

       ATTACHED EXHIBITS  
  x   N/A

(c) (14): TEST AND MEASUREMENT DATA:

FOLLOWS

PAGE NO.

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Sub-part

2.1033(c) (14):

TEST AND MEASUREMENT DATA

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts:

- \_\_\_\_\_ 21 - Domestic Public Fixed Radio Services
- \_\_\_\_\_ 22 - Public Mobile Services
- x   22 Subpart H - Cellular Radiotelephone Service
- \_\_\_\_\_ 22.901(d) - Alternative technologies and auxiliary services
- \_\_\_\_\_ 23 - International Fixed Public Radiocommunication services
- \_\_\_\_\_ 24 - Personal Communications Services
- \_\_\_\_\_ 74 Subpart H - Low Power Auxiliary Stations
- \_\_\_\_\_ 80 - Stations in the Maritime Services
- \_\_\_\_\_ 80 Subpart E - General Technical Standards
- \_\_\_\_\_ 80 Subpart F - Equipment Authorization for Compulsory Ships
- \_\_\_\_\_ 80 Subpart K - Private Coast Stations and Marine Utility Stations
- \_\_\_\_\_ 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
- \_\_\_\_\_ 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
- \_\_\_\_\_ 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
- \_\_\_\_\_ 80 Subpart V - Emergency Position Indicating Radiobeacons (EPIRB'S)
- \_\_\_\_\_ 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
- \_\_\_\_\_ 80 Subpart X - Voluntary Radio Installations
- \_\_\_\_\_ 87 - Aviation Services
- \_\_\_\_\_ 90 - Private Land Mobile Radio Services
- \_\_\_\_\_ 94 - Private Operational-Fixed Microwave Service
- \_\_\_\_\_ 95 Subpart A - General Mobile Radio Service (GMRS)
- \_\_\_\_\_ 95 Subpart C - Radio Control (R/C) Radio Service
- \_\_\_\_\_ 95 Subpart D - Citizens Band (CB) Radio Service
- \_\_\_\_\_ 95 Subpart E - Family Radio Service
- \_\_\_\_\_ 95 Subpart F - Interactive Video and Data Service (IVDS)
- \_\_\_\_\_ 101 - Fixed Microwave Services

GENERAL INFORMATION

1. Prior to testing, the deviation for audio modulation and each of the respective SAT + ST tones were set as close as possible to the required limit.
2. Except for audio modulation, which was applied externally, Wideband Data SAT, ST and all other tones and operational modes were provided by a test control unit incorporating appropriate software. Worst case repetition rate for Wideband Data was 10 kb/s.
3. Spurious radiation was measured at three (3) meters.
4. The two cellular frequency bands are available to the user automatically. Please refer to the manual contained in the documentation.
5. The normal modes of modulation are:
  - (a) VOICE
  - (b) WIDEBAND DATA
  - (c) SAT
  - (d) ST
  - (e) SAT + VOICE
  - (f) SAT + DTMF
  - (g) CDMA
  - (h) TDMA
  - (i) NAMPS VOICE
  - (j) NAMPS DSAT
  - (k) NAMPS ST
  - (l) NAMPS VOICE + DSAT
  - (m) GMSK

PAGE NO.

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STANDARD TEST CONDITIONS  
and  
ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst case measurements.

GUIDES:

This device was tested using the following Guide(s):

TIA/EIA/IS-732-409

PAGE NO. 7 of 26.  
NAME OF TEST: Carrier Output Power (Conducted)  
SPECIFICATION: 47 CFR 2.1046(a)  
GUIDE: As indicated on page 6  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT was connected to a resistive coaxial attenuator of normal load impedance, and the unmodulated output power was measured by means of an R. F. Power Meter.
2. Measurement accuracy is  $\pm 3\%$ .

MEASUREMENT RESULTS

FREQUENCY OF CARRIER, MHz = 836.4, 824.04, 848.97

POWER SETTING	R. F. POWER, WATTS
Low	0.006
High	0.6

SUPERVISED BY:

*Morton Flom P. Eng.*

Morton Flom, P. Eng.

TRANSMITTER POWER CONDUCTED MEASUREMENTS

TEST 1: R. F. POWER OUTPUT  
 TEST 2: FREQUENCY STABILITY

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TEST SAMPLE (1) (2)

POWER SUPPLY (3)

Asset	Description	s/n
(1)	<u>COAXIAL ATTENUATOR</u>	
_____	i00122 Narda 766-10	7802
<u>x</u> _____	i00123 Narda 766-10	7802A
_____	i00069 Bird 8329 (30 dB)	1006
_____	i00113 Sierra 661A-3D	1059
(2)	<u>POWER METERS</u>	
_____	i00014 HP 435A	1733A05836
_____	i00039 HP 436A	2709A26776
<u>x</u> _____	i00020 HP 8901A POWER MODE	2105A01087
(3)	<u>FREQUENCY COUNTER</u>	
_____	i00042 HP 5383A	1628A00959
_____	i00019 HP 5334B	2704A00347
<u>x</u> _____	i00020 HP 8901A FREQUENCY MODE	2105A01087

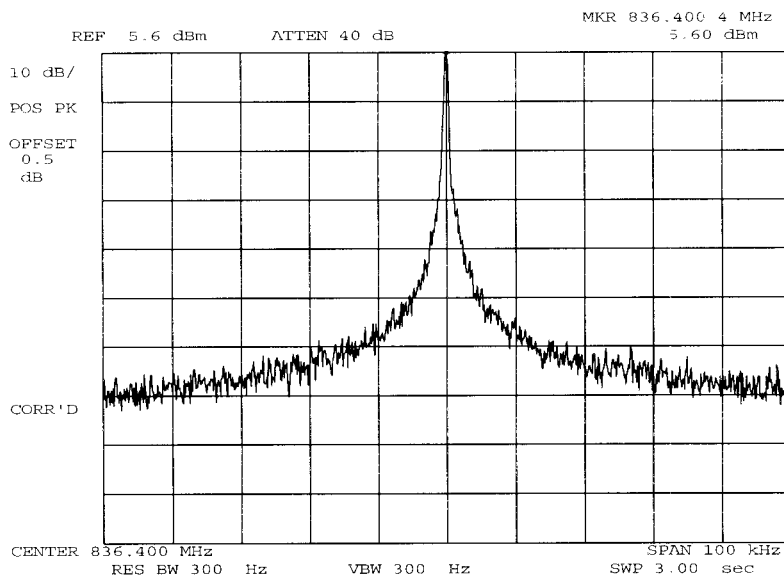
PAGE NO. 9 of 26.  
NAME OF TEST: Emission Masks (Occupied Bandwidth)  
SPECIFICATION: 47 CFR 2.1049(c)(1)  
GUIDE: As indicated on page 6  
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page, with the Spectrum Analyzer connected.
2. For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for  $\pm 2.5$  kHz deviation (or 50% modulation). With level constant, the signal level was increased 16 dB.
3. For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.
4. The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.
5. MEASUREMENT RESULTS: ATTACHED

PAGE NO. 10 of 26.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9940075: 1999-Apr-06 Tue 10:54:00  
STATE: 1:Low Power



POWER: LOW  
MODULATION: NONE

SUPERVISED BY:

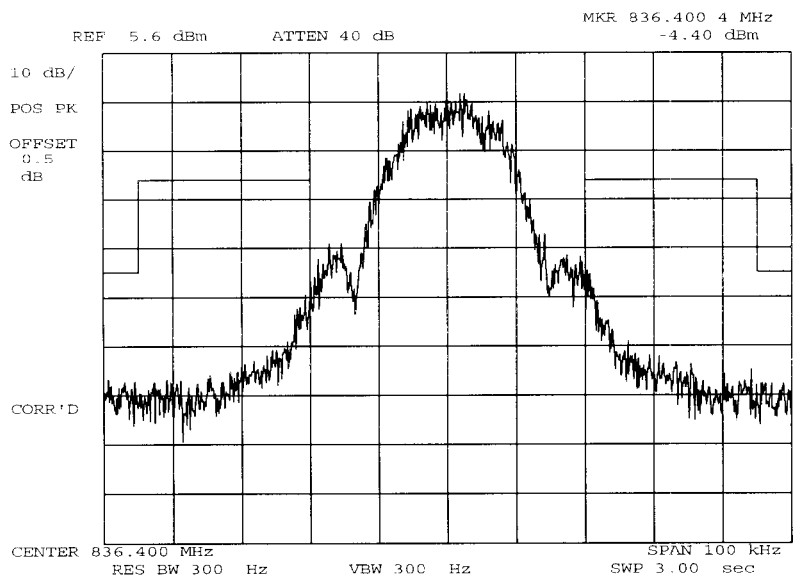
Morton Flom, P. Eng.



PAGE NO.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9940079: 1999-Apr-06 Tue 11:50:00  
STATE: 1:Low Power



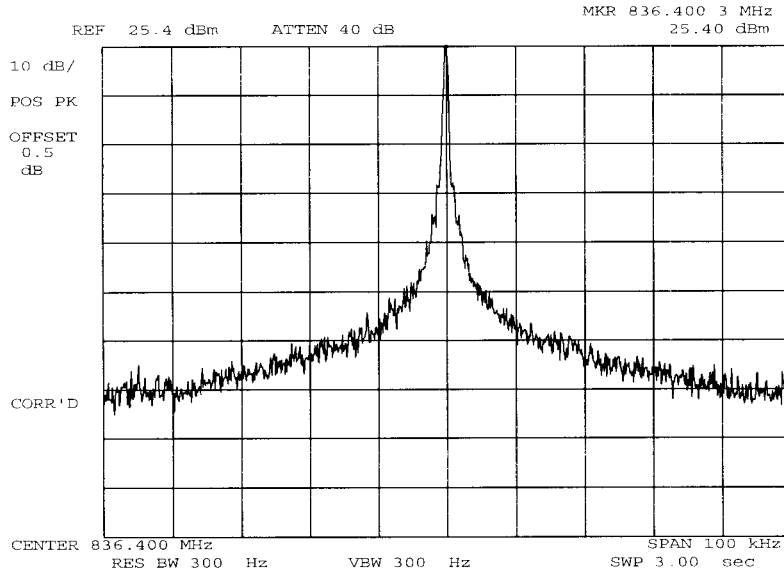
POWER: LOW  
MODULATION: DATA GMSK  
MASK: AMPS CELLULAR, F1D,  
DATA

SUPERVISED BY:

Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9940076: 1999-Apr-06 Tue 10:56:00  
STATE: 2:High Power



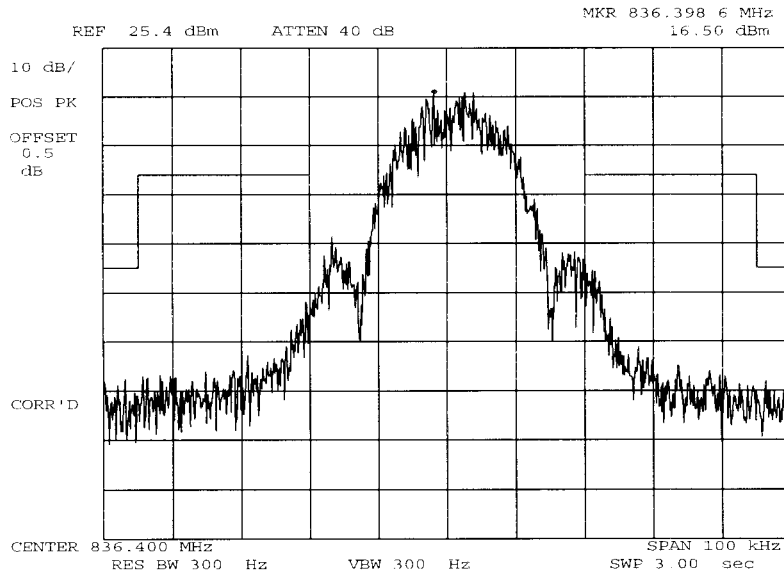
POWER: HIGH  
MODULATION: NONE

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 13 of 26.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9940077: 1999-Apr-06 Tue 11:34:00  
STATE: 2:High Power



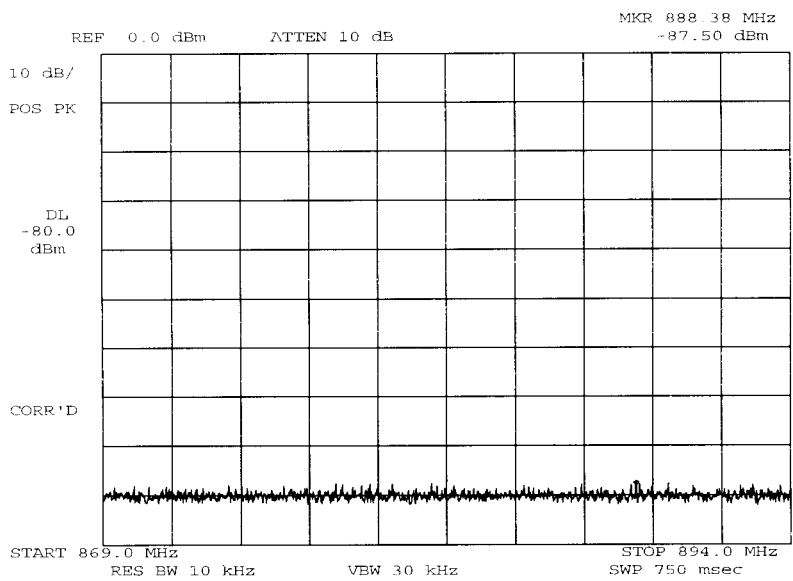
POWER: HIGH  
MODULATION: DATA GMSK  
MASK: AMPS CELLULAR, F1D,  
DATA

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 14 of 26.

NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9940083: 1999-Apr-06 Tue 12:02:00  
STATE: 1:Low Power



POWER: LOW  
MODULATION: DATA GMSK  
TX SPURS IN RX CRITICAL BAND

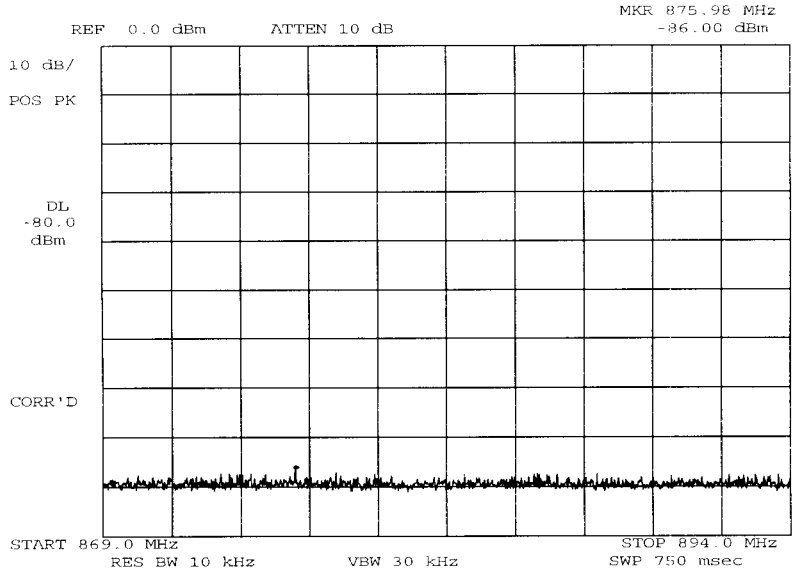
SUPERVISED BY:

Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9940082: 1999-Apr-06 Tue 11:59:00  
STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
DATA GMSK  
TX SPURS IN RX CRITICAL  
BAND

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 16 of 26.

NAME OF TEST: Emission Requirements -  
Worst Case Modulation & Wideband Data

SPECIFICATION: 47 CFR 22.917

GUIDE: As indicated on page 6

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT was connected to a coaxial attenuator and then to a spectrum analyzer. The unmodulated carrier was set for 0 dB reference level.
2. A notch filter was introduced to reduce or eliminate any spectrum analyzer internally generated spurious for measurements of the harmonics and the carrier level.
3. Spectrum analyzer bandwidth was set to section 22.917(h) as applicable.
4. Measurements were made on channels 380, 799 and 991.
5. All other spurious emissions over the range of 0 the beyond the 10<sup>th</sup> harmonic (10 GHz) were 20 dB or more below the limit
6. The data presented here is for the Worst Case.
7. MEASUREMENT RESULTS: ATTACHED

PAGE NO.

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MEASUREMENT SUMMARY: Emission Requirements -  
Worst Case Modulation

WORST CASE MODULATION = GMSK

EMISSION, MHz/HARM.	LIMIT, dBc	SPURIOUS EMISSIONS, dBc	
		Lo	Hi
F0 + 20 kHz to F0 + 45 kHz	≤-26	≤-42.0	≤-38.0
F0 + 45 kHz to 2 <sup>nd</sup> Harmonic	≤-60 or 43 + 10 log P	≤-65.0	≤-71.0
2 <sup>nd</sup> to 10 <sup>th</sup>	(≤-13 dBm)	≤-49.0	≤-70.0

MEASUREMENT RESULTS = ATTACHED OFFSET PLOTS

## EMISSION IN THE RECEIVER CRITICAL BAND

EMISSION, MHz/HARM.	LIMIT, dBm	SPURIOUS EMISSIONS, dBm	
		Lo	Hi
869 to 894	≤-80	≤-87.5	≤-86.0

MEASUREMENT RESULTS = ATTACHED PLOTS

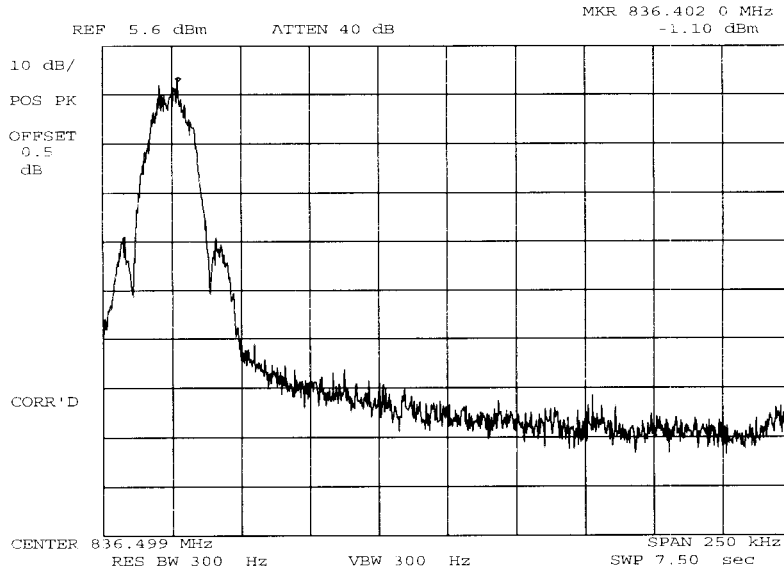
SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9940080: 1999-Apr-06 Tue 11:53:00  
STATE: 1:Low Power



POWER:  
MODULATION:

LOW  
DATA GMSK  
OFFSET OCCUPIED BANDWIDTH

SUPERVISED BY:

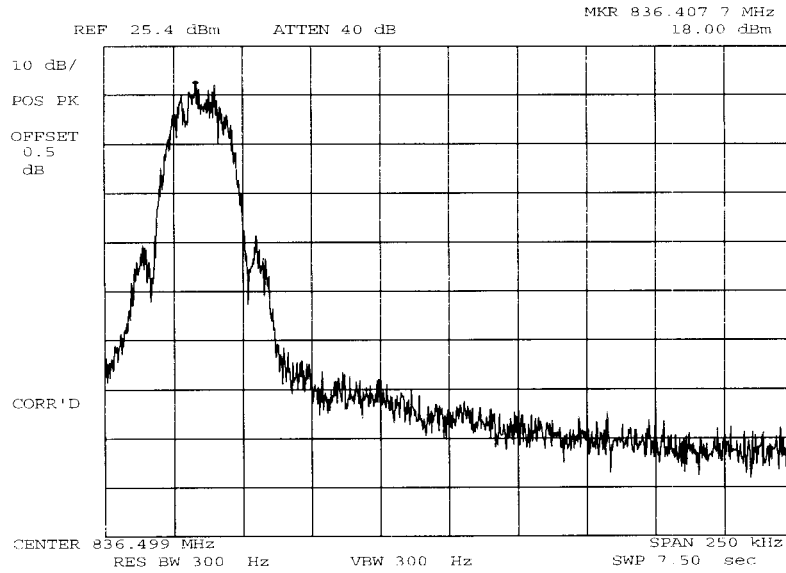
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PAGE NO.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)  
g9940081: 1999-Apr-06 Tue 11:55:00  
STATE: 2:High Power



POWER:  
MODULATION:

HIGH  
DATA GMSK  
OFFSET OCCUPIED BANDWIDTH

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 20 of 26.  
NAME OF TEST: Spurious Emissions at Antenna Terminals  
SPECIFICATION: 47 CFR 2.1051, 22.917  
GUIDE: As indicated on page 6  
TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT was connected to a coaxial attenuator and then to a Spectrum Analyzer.
2. A notch filter was introduced to reduce or eliminate spurious emission which could be generated internally in the spectrum analyzer.
3. Measurements were made over the range from 45 kHz to 10 GHz for the worst case modulation so both the highest and lowest R.F. power settings.
4. All other emissions were 20 dB or more below the limit.
5. Spectrum analyzer bandwidth was set to section 22.917(h) as applicable.
6. MEASUREMENT RESULTS: ATTACHED

PAGE NO.

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g9940085: 1999-Apr-06 Tue 12:24:00  
 STATE: 1:Low Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
824.040000	1647.688000	-54.4	-60	-41.4
836.400000	1673.287000	-53.9	-59.5	-40.9
848.970000	1698.386000	-53.3	-58.9	-40.3
824.040000	2472.271000	-52.9	-58.5	-39.9
836.400000	2509.378000	-55	-60.6	-42
848.970000	2547.262000	-54.1	-59.7	-41.1
824.040000	3295.933000	-55.6	-61.2	-42.6
836.400000	3345.604000	-55.7	-61.3	-42.7
848.970000	3395.573000	-54.9	-60.5	-41.9
824.040000	4119.922000	-56	-61.6	-43
836.400000	4182.264000	-54.1	-59.7	-41.1
848.970000	4245.227000	-55.6	-61.2	-42.6
824.040000	4943.893000	-54.9	-60.5	-41.9
836.400000	5018.266000	-54.6	-60.2	-41.6
848.970000	5093.822000	-55.7	-61.3	-42.7
824.040000	5768.737000	-54.2	-59.8	-41.2
836.400000	5854.573000	-49.3	-54.9	-36.3
848.970000	5942.535000	-49.4	-55	-36.4
824.040000	6591.861000	-48.2	-53.8	-35.2
836.400000	6690.725000	-47.6	-53.2	-34.6
848.970000	6791.634000	-49.1	-54.7	-36.1
824.040000	7416.300000	-49.3	-54.9	-36.3
836.400000	7527.236000	-49.4	-55	-36.4
848.970000	7640.786000	-48.8	-54.4	-35.8
824.040000	8239.944000	-49.7	-55.3	-36.7
836.400000	8364.369000	-48.9	-54.5	-35.9
848.970000	8489.614000	-49.2	-54.8	-36.2
824.040000	9064.820000	-49	-54.6	-36
836.400000	9200.665000	-49.5	-55.1	-36.5
848.970000	9338.859000	-48.7	-54.3	-35.7
824.040000	9888.473000	-48.6	-54.2	-35.6
836.400000	10036.320000	-49.7	-55.3	-36.7
848.970000	10187.680000	-47	-52.6	-34
824.040000	10712.175000	-49.4	-55	-36.4
836.400000	10873.548000	-47.7	-53.3	-34.7
848.970000	11036.385000	-48.3	-53.9	-35.3
824.040000	11536.747000	-48.1	-53.7	-35.1
836.400000	11709.929000	-48.5	-54.1	-35.5
848.970000	11886.066000	-48.9	-54.5	-35.9
824.040000	12360.381000	-48.3	-53.9	-35.3
836.400000	12546.416000	-44.5	-50.1	-31.5
848.970000	12734.604000	-44.2	-49.8	-31.2

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)  
 g9940084: 1999-Apr-06 Tue 12:14:00  
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
824.040000	1648.077000	-45.6	-71	-32.6
836.400000	1672.813000	-46.7	-72.1	-33.7
848.970000	1697.929000	-41.9	-67.3	-28.9
824.040000	2472.113000	-52.2	-77.6	-39.2
836.400000	2509.189000	-52.8	-78.2	-39.8
848.970000	2546.927000	-53.2	-78.6	-40.2
824.040000	3295.892000	-55.6	-81	-42.6
836.400000	3345.636000	-55.5	-80.9	-42.5
848.970000	3395.491000	-55.7	-81.1	-42.7
824.040000	4119.977000	-55.4	-80.8	-42.4
836.400000	4182.007000	-55.6	-81	-42.6
848.970000	4245.121000	-56.3	-81.7	-43.3
824.040000	4944.693000	-56.8	-82.2	-43.8
836.400000	5018.756000	-55.5	-80.9	-42.5
848.970000	5093.427000	-56.2	-81.6	-43.2
824.040000	5768.336000	-54.7	-80.1	-41.7
836.400000	5854.865000	-50.3	-75.7	-37.3
848.970000	5943.162000	-50.5	-75.9	-37.5
824.040000	6592.371000	-50.2	-75.6	-37.2
836.400000	6690.760000	-50.3	-75.7	-37.3
848.970000	6791.800000	-50.6	-76	-37.6
824.040000	7416.128000	-50.4	-75.8	-37.4
836.400000	7528.078000	-48.6	-74	-35.6
848.970000	7640.745000	-50.1	-75.5	-37.1
824.040000	8240.342000	-48.9	-74.3	-35.9
836.400000	8364.328000	-48.4	-73.8	-35.4
848.970000	8489.631000	-50.3	-75.7	-37.3
824.040000	9064.552000	-50.3	-75.7	-37.3
836.400000	9200.521000	-48.9	-74.3	-35.9
848.970000	9339.130000	-50.1	-75.5	-37.1
824.040000	9888.519000	-49.3	-74.7	-36.3
836.400000	10037.159000	-48.8	-74.2	-35.8
848.970000	10187.279000	-49.5	-74.9	-36.5
824.040000	10712.280000	-50.6	-76	-37.6
836.400000	10872.921000	-49.9	-75.3	-36.9
848.970000	11036.709000	-49.6	-75	-36.6
824.040000	11536.696000	-49.3	-74.7	-36.3
836.400000	11709.964000	-47.8	-73.2	-34.8
848.970000	11885.941000	-49.6	-75	-36.6
824.040000	12360.527000	-48.3	-73.7	-35.3
836.400000	12545.752000	-44.7	-70.1	-31.7
848.970000	12734.795000	-45.7	-71.1	-32.7

PAGE NO. 23 of 26.  
NAME OF TEST: Frequency Stability (Temperature Variation)  
SPECIFICATION: 47 CFR 2.1055(a)(1)  
GUIDE: As indicated on page 6  
TEST CONDITIONS: As Indicated  
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page.
2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
4. The temperature tests were performed for the worst case.
5. MEASUREMENT RESULTS: ATTACHED

TRANSMITTER TEST SET-UP

- TEST A. OPERATIONAL STABILITY
- TEST B. CARRIER FREQUENCY STABILITY
- TEST C. OPERATIONAL PERFORMANCE STABILITY
- TEST D. HUMIDITY
- TEST E. VIBRATION
- TEST F. ENVIRONMENTAL TEMPERATURE
- TEST G. FREQUENCY STABILITY: TEMPERATURE VARIATION
- TEST H. FREQUENCY STABILITY: VOLTAGE VARIATION

TEST SAMPLE (2) (3)

(1)

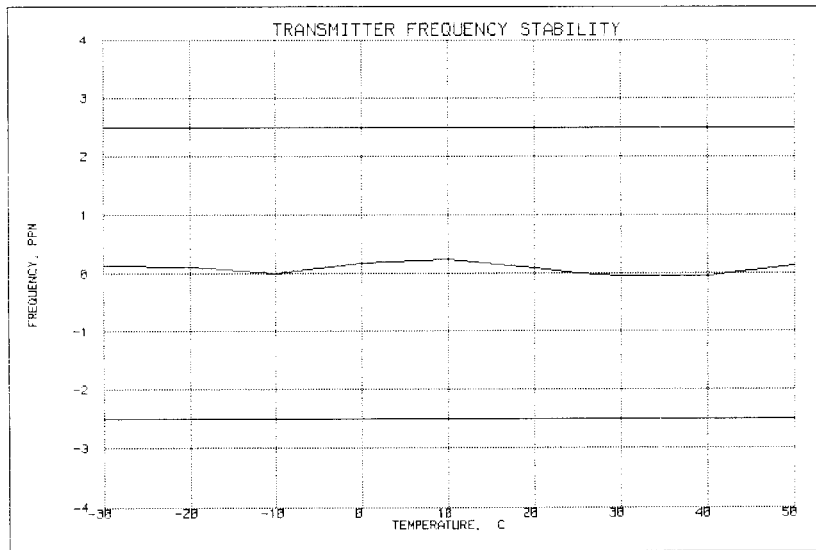
POWER SUPPLY (4)

Asset	Description	s/n
(1)	<u>TEMPERATURE, HUMIDITY, VIBRATION</u>	
<u>x</u>	i00027 Tenny Temp. Chamber	9083-765-234
---	i00 Weber Humidity Chamber	
---	i00 L.A.B. RVH 18-100	
(2)	<u>COAXIAL ATTENUATOR</u>	
<u>x</u>	i00122 NARDA 766-10	7802
---	i00123 NARDA 766-10	7802A
---	i00113 SIERRA 661A-3D	1059
---	i00069 BIRD 8329 (30 dB)	10066
(3)	<u>R.F. POWER</u>	
---	i00014 HP 435A POWER METER	1733A05839
<u>x</u>	i00039 HP 436A POWER METER	2709A26776
<u>x</u>	i00020 HP 8901A POWER MODE	2105A01087
(4)	<u>FREQUENCY COUNTER</u>	
---	i00042 HP 5383A	1628A00959
---	i00019 HP 5334B	2704A00347
<u>x</u>	i00020 HP 8901A	2105A01087

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NAME OF TEST: Frequency Stability (Temperature Variation)  
g98b0478: 1998-Nov-24 Tue 12:44:00  
STATE: 0:General



SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 26 of 26.  
NAME OF TEST: Frequency Stability (Voltage Variation)  
SPECIFICATION: 47 CFR 2.1055 (b)(1)  
GUIDE: As indicated on page 6  
TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT was placed in a temperature chamber at 25±5°C and connected as for "Frequency Stability - Temperature Variation" test.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case. Use 'best' data only.');

RESULTS: Frequency Stability (Voltage Variation)

LIMIT, ppm = 2.5  
 LIMIT, Hz = 2091  
 BATTERY ENDPOINT (Voltage) = 3.3

% of STV	Voltage	Frequency, MHz	Change, Hz	Change, ppm
85	3.06	836.400000	0	0.00
100	3.6	836.400000	0	0.00
115	4.14	836.400010	10	0.01
85	3.2	836.399930	-70	-0.08

SUPERVISED BY:

Morton Flom, P. Eng.



TESTIMONIAL  
AND  
STATEMENT OF CERTIFICATION

THIS IS TO CERTIFY THAT:

1. THAT the application was prepared either by, or under the direct supervision of, the undersigned.
2. THAT the technical data supplied with the application was taken under my direction and supervision.
3. THAT the data was obtained on representative units, randomly selected.
4. THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

CERTIFYING ENGINEER:



Morton Flom, P. Eng.