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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 85224
- c) Report Number: d98c0011
- d) Client: Novatel Wireless Technologies Ltd.
6715 - 8th St., N.E., Suite 200
Calgary, AB T2E 7H7 Canada
- e) Identification: NRM-6832
FCC ID: NBZNRM-6832
Description: CDPD Modem Module
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: December 7, 1998
EUT Received: November 23, 1998
- 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.

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LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

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

1.1310, 22(H), 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:

Wong's Electronics Co. Ltd./Welco China Ltd.
Man Fung Wan Lak Electronics Factory
Man Fung Industrial Estate, Sha Jing, Po
On, Shenzhen,
Guang Dong Province,
People's Republic of China

(c) (2): FCC ID: NBZNRM-6832

MODEL NO: NRM-6832

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

PLEASE SEE ATTACHED EXHIBITS

(c) (4): TYPE OF EMISSION: 28K8FXW

(c) (5): FREQUENCY RANGE, MHz: 824 to 849

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

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

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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, Vdc = 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

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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

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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

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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.

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NAME OF TEST: R. F. Power Output (Radiated)

SPECIFICATION: 47 CFR 2.1046(a)

GUIDE: EIA/IS-19-B-1988
TIA/EIA/IS-137-A-1996

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE (RADIATED)

1. The EUT was placed on an open-field site and its radiated field strength at a known distance was measured by means of a spectrum analyzer. Equivalent loading was calculated from the equation $P_t = ((E \times R)^2 / 49.2)$ watts, where $R = 3m$.
2. Measurement accuracy is ± 1.5 dB.

MEASUREMENT RESULTS

g98b0377: 1998-Nov-23 Mon 15:39:00

STATE: 1:Low Power

AMPS MODE:

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	uV/m @ 3m	ERP, dBm	ERP, Watts
824.040000	824.040000	75.72	30.66	208449.09	9.05	0.008
836.400000	836.403000	76.43	30.69	226986.49	9.75	0.009
836.400000	848.970000	76.15	30.73	220800.47	9.55	0.009

g98b0376: 1998-Nov-23 Mon 12:00:00

STATE: 2:High Power

AMPS MODE:

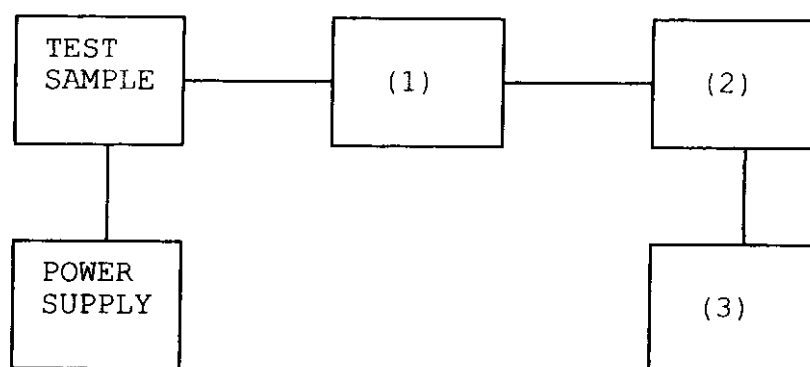
FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	uV/m @ 3m	ERP, dBm	ERP, Watts
824.040000	824.038000	95.29	30.66	1983809.66	28.55	0.716
836.400000	836.400000	95.86	30.69	2125690.35	29.15	0.822
848.970000	848.968000	95.08	30.73	1952090.73	28.45	0.700

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TRANSMITTER POWER CONDUCTED MEASUREMENTS

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



Asset	Description	s/n
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(1) COAXIAL ATTENUATOR

_____	i00122 Narda 766-10	7802
_____	i00123 Narda 766-10	7802A
_____	i00069 Bird 8329 (30 dB)	1006
<u>x</u>	i00113 Sierra 661A-3D	1059

(2) POWER METERS

_____	i00014 HP 435A	1733A05836
<u>x</u>	i00039 HP 436A	2709A26776
<u>x</u>	i00020 HP 8901A POWER MODE	2105A01087

(3) FREQUENCY COUNTER

_____	i00042 HP 5383A	1628A00959
<u>x</u>	i00019 HP 5334B	2704A00347
<u>x</u>	i00020 HP 8901A FREQUENCY MODE	2105A01087

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NAME OF TEST: Emission Masks (Occupied Bandwidth)

SPECIFICATION: 47 CFR 2.1049(c)(1)

GUIDE: EIA/IS-19-B-1988
TIA/EIA/IS-137-A-1996

TEST EQUIPMENT: As per previous page

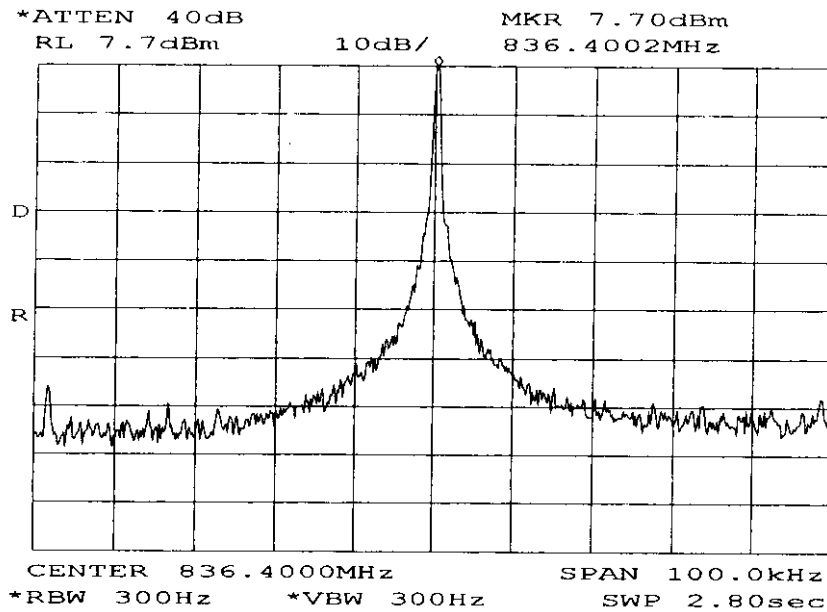
MEASUREMENT PROCEDURE

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 ± 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

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98b0363: 1998-Nov-23 Mon 12:35:00
STATE: 1:Low Power



POWER:
MODULATION:

LOW
NONE

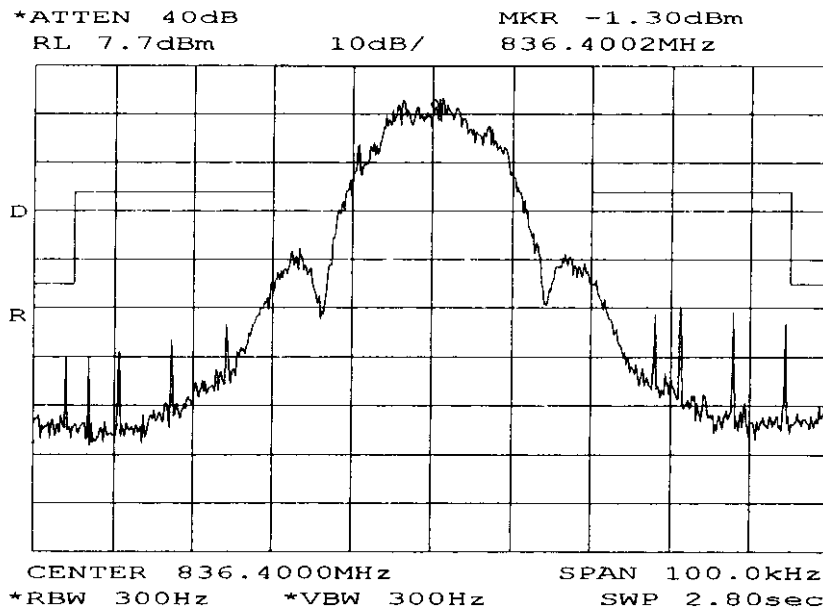
SUPERVISED BY:

M. Flom P. Eng.
Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98b0368: 1998-Nov-23 Mon 12:41:00
STATE: 1:Low Power



POWER:
MODULATION:

LOW
DATA GMSK
MASK: AMPS CELLULAR, F1D,
DATA

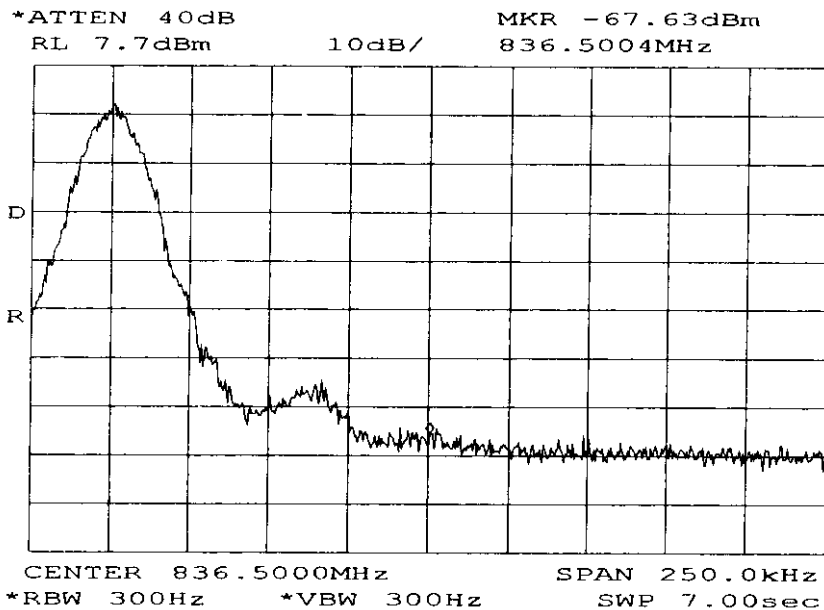
SUPERVISED BY:

M. Flom P. Eng.
Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98b0371: 1998-Nov-23 Mon 12:49:00
STATE: 1:Low Power



POWER:
MODULATION:

LOW
DATA GMSK
OFFSET OCCUPIED BANDWIDH

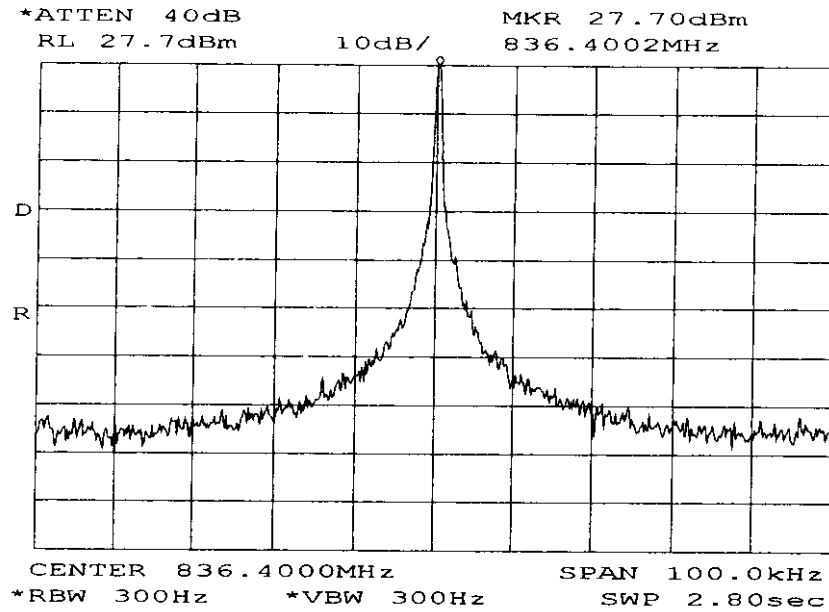
SUPERVISED BY:

Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98b0362: 1998-Nov-23 Mon 12:31:00
STATE: 2:High Power



POWER:
MODULATION:

HIGH
NONE

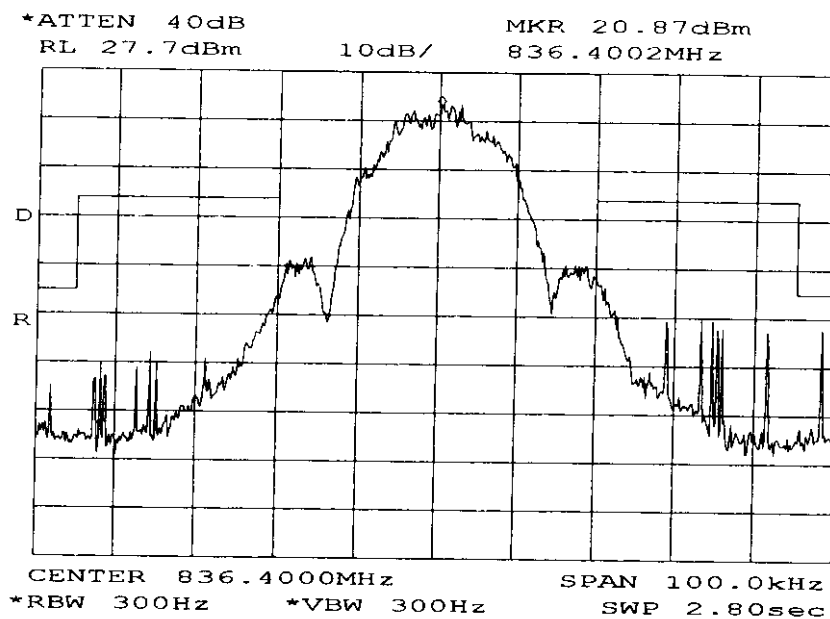
SUPERVISED BY:

Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98b0369: 1998-Nov-23 Mon 12:42:00
STATE: 2:High Power



POWER:
MODULATION:

HIGH
DATA GMSK
MASK: AMPS CELLULAR, F1D,
DATA

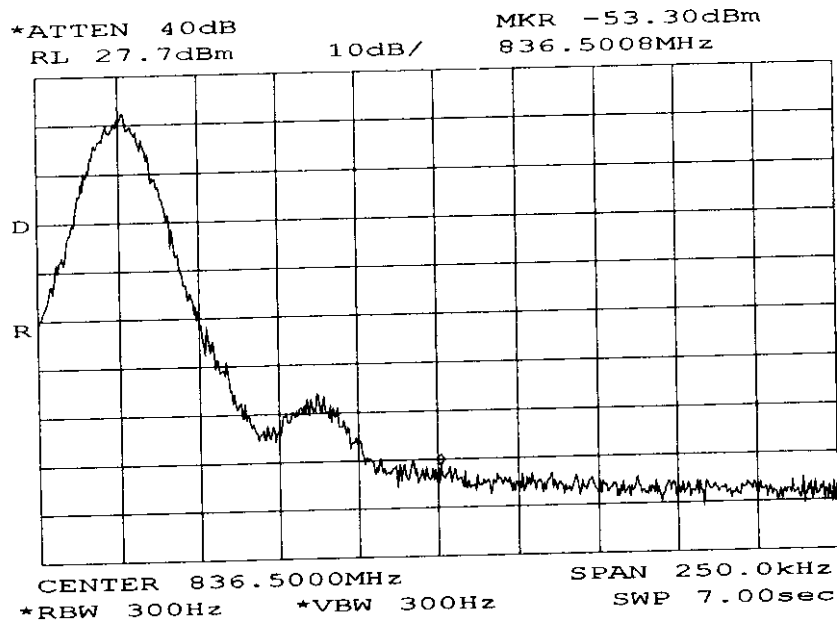
SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98b0370: 1998-Nov-23 Mon 12:48:00
STATE: 2:High Power



POWER:
MODULATION:

HIGH
DATA GMSK
OFFSET OCCUPIED BANDWIDTH

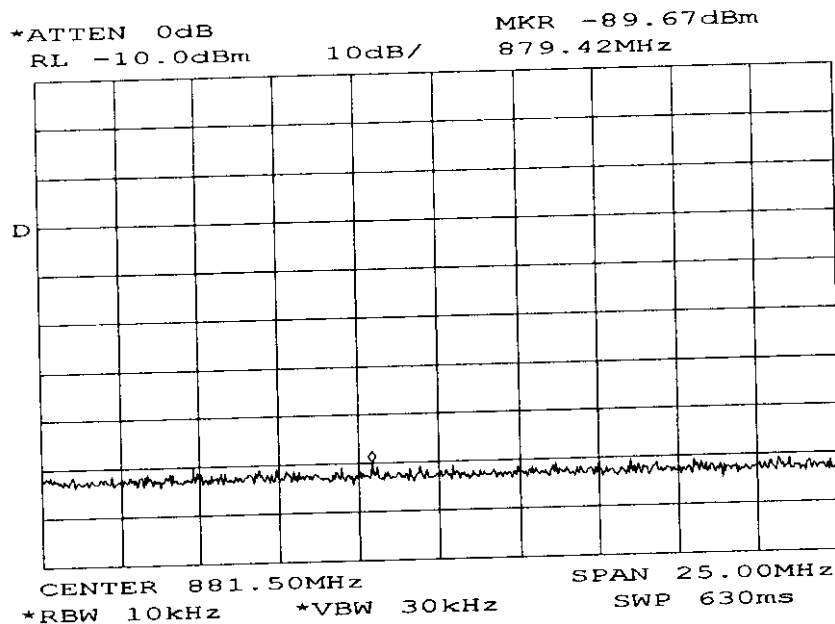
SUPERVISED BY:

M. Flom P. Eng.
Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98b0372: 1998-Nov-23 Mon 13:22:00
STATE: 1:Low Power



POWER:
MODULATION:

LOW
DATA GMSK
TX SPURS IN RX CRITICAL
BAND

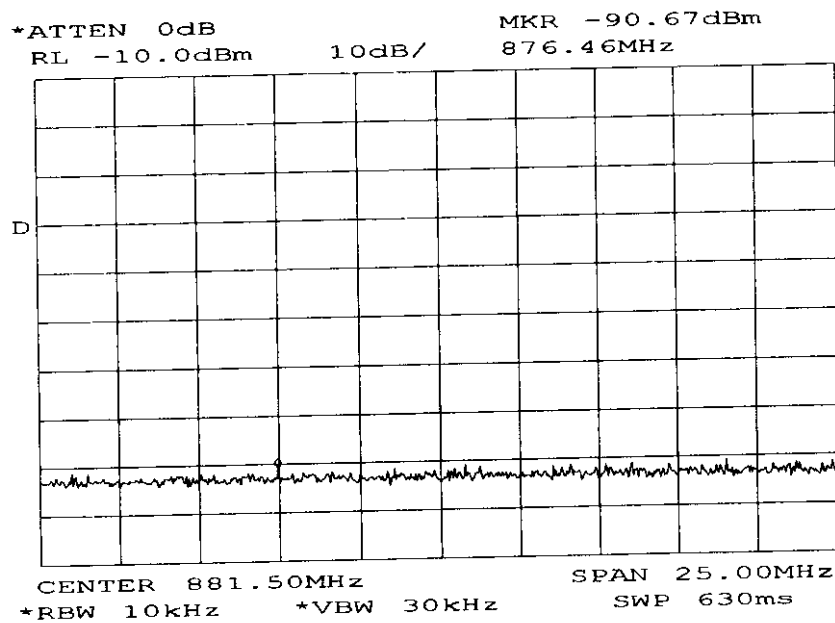
SUPERVISED BY:

Morton Flom P. Eng.
Morton Flom, P. Eng.

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NAME OF TEST: Emission Masks (Occupied Bandwidth)
g98b0373: 1998-Nov-23 Mon 13:30:00
STATE: 2:High Power



POWER:
MODULATION:

HIGH
DATA GMSK
TX SPURS IN RX CRITICAL
BAND

SUPERVISED BY:

Morton Flom, P. Eng.

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NAME OF TEST: Spurious Emissions at Antenna Terminals
SPECIFICATION: 47 CFR 2.1051, 22.917
GUIDE: EIA/IS-19-B-1988
TIA/EIA/IS-137-A-1996
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

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
 g98b0375: 1998-Nov-23 Mon 14:06:00
 STATE: 1:Low Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
836.400000	1672.708333	-36.6	-44.3	-23.6
836.400000	2509.590000	-47.8	-55.5	-34.8
836.400000	3345.670000	-49.5	-57.2	-36.5
836.400000	4181.966667	-50.5	-58.2	-37.5
836.400000	5018.471667	-50.3	-58	-37.3
836.400000	5854.573333	-50.5	-58.2	-37.5
836.400000	6690.735000	-48.5	-56.2	-35.5
836.400000	7527.783333	-48.5	-56.2	-35.5
836.400000	8364.113333	-48.6	-56.3	-35.6
836.400000	9200.481667	-48.5	-56.2	-35.5
836.400000	10036.348333	-49.5	-57.2	-36.5
836.400000	10873.493333	-46.1	-53.8	-33.1
836.400000	11709.381667	-48.8	-56.5	-35.8
836.400000	12545.863333	-49.1	-56.8	-36.1

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
 g98c0003: 1998-Dec-01 Tue 15:04:00
 STATE: 1:Low Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
824.04000	1648.076667	-37.8	-45.5	-24.8
824.04000	2471.975000	-65.7	-73.4	-52.7
824.04000	3296.073333	-68.3	-76	-55.3
824.04000	4119.735000	-67.7	-75.4	-54.7
824.04000	4944.456667	-68.7	-76.4	-55.7
824.04000	5768.043333	-68	-75.7	-55
824.04000	6591.938333	-67.5	-75.2	-54.5
824.04000	7416.110000	-67.5	-75.2	-54.5
824.04000	8240.623333	-67.8	-75.5	-54.8
824.04000	9064.698333	-66.8	-74.5	-53.8
824.04000	9888.918333	-67.7	-75.4	-54.7
824.04000	10712.440000	-67.5	-75.2	-54.5
824.04000	11536.906667	-67.2	-74.9	-54.2
824.04000	12360.736667	-66.8	-74.5	-53.8

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
 g98c0001: 1998-Dec-01 Tue 14:44:00
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
848.97000	1697.940000	-28.1	-55.8	-15.1
848.97000	2546.915000	-46	-73.7	-33
848.97000	3395.531667	-47.8	-75.5	-34.8
848.97000	4244.490000	-47.6	-75.3	-34.6
848.97000	5093.578333	-48.5	-76.2	-35.5
848.97000	5943.148333	-48	-75.7	-35
848.97000	6791.931667	-47.5	-75.2	-34.5
848.97000	7640.768333	-46.3	-74	-33.3
848.97000	8489.295000	-48	-75.7	-35
848.97000	9338.280000	-47.1	-74.8	-34.1
848.97000	10188.075000	-47.3	-75	-34.3
848.97000	11036.350000	-47.5	-75.2	-34.5
848.97000	11885.923333	-47	-74.7	-34
848.97000	12734.668333	-46.5	-74.2	-33.5

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NAME OF TEST: Unwanted Emissions (Transmitter Conducted)
 g98c0004: 1998-Dec-01 Tue 15:09:00
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, dBm	LEVEL, dBc	MARGIN, dB
824.04000	1648.076667	-28.8	-56.5	-15.8
824.04000	2471.806667	-47	-74.7	-34
824.04000	3295.861667	-47.5	-75.2	-34.5
824.04000	4120.546667	-48.8	-76.5	-35.8
824.04000	4944.265000	-48.3	-76	-35.3
824.04000	5767.901667	-48.6	-76.3	-35.6
824.04000	6591.838333	-47.5	-75.2	-34.5
824.04000	7415.863333	-47.1	-74.8	-34.1
824.04000	8240.328333	-46.6	-74.3	-33.6
824.04000	9064.245000	-47.3	-75	-34.3
824.04000	9888.886667	-47.6	-75.3	-34.6
824.04000	10712.021667	-46.6	-74.3	-33.6
824.04000	11536.118333	-47.8	-75.5	-34.8
824.04000	12360.445000	-47.5	-75.2	-34.5

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NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

GUIDE: EIA/IS-19-B-1988
TIA/EIA/IS-137-A-1996

TEST EQUIPMENT: As per attached page

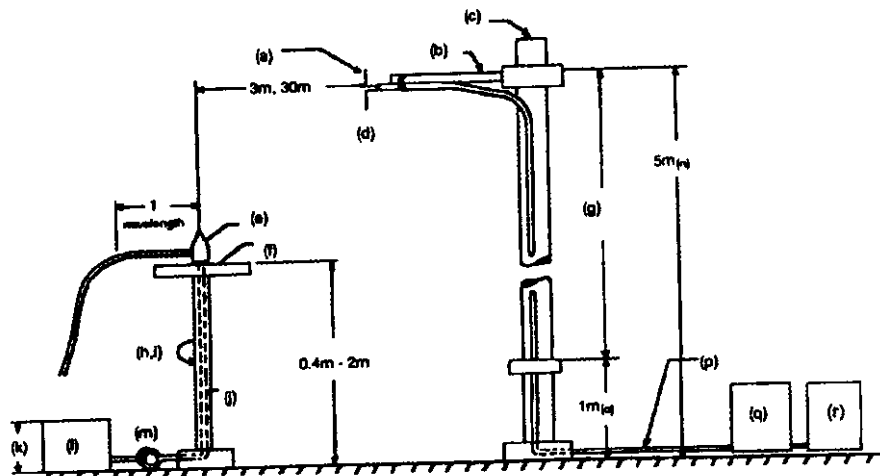
MEASUREMENT PROCEDURE

1. A description of the measurement facilities was filed with the FCC and was found to be in compliance with the requirements of Section 15.38, by letter from the FCC dated March 3, 1997, FILE 31040/SIT. All pertinent changes will be reported to the Commission by up-date prior to March 2000.
2. At first, in order to locate all spurious frequencies and approximate amplitudes, and to determine proper equipment functioning, the test sample was set up at a distance of three meters from the test instrument. Valid spurious signals were determined by switching the power on and off.
3. In the field, the test sample was placed on a wooden turntable above ground at three (or thirty) meters away from the search antenna. Excess power leads were coiled near the power supply.

The cables were oriented in order to obtain the maximum response. At each emission frequency, the turntable was rotated and the search antennas were raised and lowered vertically.
4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.
6. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.
7. The worst case for all channels is shown.
8. Measurement results: ATTACHED FOR WORST CASE

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RADIATED TEST SETUP

NOTES:

- (a) Search Antenna - Rotatable on boom
 (b) Non-metallic boom
 (c) Non-metallic mast
 (d) Adjustable horizontally
 (e) Equipment Under Test
 (f) Turntable
 (g) Boom adjustable in height.
 (h) External control cables routed horizontally at least one wavelength.
 (i) Rotatable

- (j) Cables routed through hollow turntable center
 (k) 30 cm or less
 (l) External power source
 (m) 10 cm diameter coil of excess cable
 (n) 25 cm (V), 1 m-7 m (V, H)
 (o) 25 cm from bottom end of 'V', 1m normally
 (p) Calibrated Cable at least 10m in length
 (q) Amplifier (optional)
 (r) Spectrum Analyzer

Asset	Description	s/n	Cycle	Last Cal
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Per ANSI C63.4-1992, 10.1.4

TRANSDUCER

_____	i00065	EMCO 3109B 100Hz-50MHz	2336	12 mo.	
_____	i00033	Singer 94593-1 10kHz-32MHz	0219	12 mo.	
_____	i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Oct-98
x	i00089	Apriel 2001 200MHz-1GHz	001500	12 mo.	Oct-98
x	i00103	EMCO 3115 1GHz-18GHz	9208-3925	12 mo.	Oct-98
_____	i00085	EMCO 3116 10GHz-40GHz	2076	12 mo.	

AMPLIFIER

_____	i00028	HP 8449A	2749A00121	12 mo.	Mar-98
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SPECTRUM ANALYZER

_____	i00029	HP 8563E	3213A00104	12 mo.	
x	i00033	HP 85462A	3625A00357	12 mo.	Dec-97
_____	i00048	HP 8566B	2511AD1467	6 mo.	Mar-98

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NAME OF TEST: Field Strength of Spurious Radiation
 g98b0382: 1998-Nov-24 Tue 13:29:00
 STATE: 1:Low Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	ERP, dBm	MARGIN , dB
824.040000	1648.080000	35.67	31.65	2322.74	-30.05	-17.1
836.400000	1672.700250	30.33	31.81	1279.38	-35.25	-22.3
848.970000	1697.942500	29.83	31.97	1230.27	-35.55	-22.6
824.040000	2472.120000	46.5	5.83	413.52	-45.05	-32.1
836.400000	2509.217084	45.83	5.99	389.94	-45.55	-32.6
848.970000	2547.029167	45.83	6.18	398.57	-45.35	-32.4
824.040000	3296.160000	43.17	9.32	421.21	-44.85	-31.9
836.400000	3345.683751	41.17	9.48	340.8	-46.75	-33.8
848.970000	3396.049167	40.83	9.65	334.2	-46.85	-33.9
824.040000	4120.200000	43	11.34	521.19	-43.05	-30.1
836.400000	4182.150418	41.5	11.32	437.52	-44.55	-31.6
848.970000	4245.069167	38.83	11.3	321	-47.25	-34.3
824.040000	4944.240000	41.17	13.17	521.19	-43.05	-30.1
836.400000	5018.617085	38.67	13.46	404.11	-45.25	-32.3
848.970000	5094.089167	39.33	13.72	449.26	-44.35	-31.4
824.040000	5768.280000	39.5	15.55	565.59	-42.35	-29.4
836.400000	5855.083752	38.83	15.73	534.56	-42.85	-29.8
848.970000	5943.109167	37.83	15.9	485.85	-43.65	-30.7
824.040000	6592.320000	39	16.76	613.76	-41.65	-28.6
836.400000	6691.550419	38.33	17.07	588.84	-41.95	-29
848.970000	6792.129167	37.17	17.38	533.95	-42.85	-29.9
824.040000	7416.360000	40.83	19.21	1004.62	-37.35	-24.4
836.400000	7528.017086	38	19.49	749.03	-39.85	-26.9
848.970000	7641.149167	38	19.66	763.84	-39.75	-26.7
824.040000	8240.400000	40	20.6	1071.52	-36.75	-23.8
836.400000	8364.483753	39.33	20.81	1016.25	-37.25	-24.3
848.970000	8490.169167	38.5	21.03	947.33	-37.85	-24.9

Fundamental Emissions (As previously shown on page 7)
 g98b0377: 1998-Nov-23 Mon 15:39:00
 STATE: 1:Low Power
 AMPS MODE:

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	uV/m @ 3m	ERP, dBm	ERP, Watts
824.040000	824.040000	75.72	30.66	208449.09	9.05	0.008
836.400000	836.403000	76.43	30.69	226986.49	9.75	0.009
836.400000	848.970000	76.15	30.73	220800.47	9.55	0.009

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NAME OF TEST: Field Strength of Spurious Radiation
 g98b0381: 1998-Nov-24 Tue 09:18:00
 STATE: 2:High Power

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV	CF, dB	uV/m @ 3m	ERP, dBm	MARGIN , dB
824.040000	1648.235000	47.33	31.65	8892.01	-18.35	-5.4
836.400000	1672.850000	43.33	31.81	5714.79	-22.25	-9.3
848.970000	1697.990000	41.5	31.97	4715.2	-23.95	-10.9
824.040000	2472.325000	38.83	35.83	5407.54	-22.75	-9.7
836.400000	2509.450000	51.67	5.99	763.84	-39.75	-26.7
848.970000	2547.110000	51.83	6.18	795.24	-39.35	-26.4
824.040000	3296.215000	46.83	9.32	641.95	-41.25	-28.3
836.400000	3345.600000	47.17	9.48	679.99	-40.75	-27.8
848.970000	3395.796667	46.67	9.65	654.64	-41.05	-28.1
824.040000	4120.255001	47.5	11.34	874.98	-38.55	-25.6
836.400000	4182.000000	46.17	11.32	749.03	-39.85	-26.9
848.970000	4244.766667	41.17	11.3	420.24	-44.95	-31.9
824.040000	4944.261668	42	13.17	573.46	-42.25	-29.2
836.400000	5018.400000	39.5	13.46	444.63	-44.45	-31.4
848.970000	5093.736667	39	13.71	432.02	-44.65	-31.7
824.040000	5768.268335	39	15.55	533.95	-42.85	-29.9
836.400000	5854.800000	37.83	15.73	476.43	-43.85	-30.8
848.970000	5942.706667	38.67	15.9	535.18	-42.85	-29.8
824.040000	6592.275002	38.17	16.76	557.83	-42.45	-29.5
836.400000	6691.200000	37.83	17.07	555.9	-42.45	-29.5
848.970000	6791.676667	37.83	17.37	575.44	-42.15	-29.2
824.040000	7416.281669	39	19.21	813.77	-39.15	-26.2
836.400000	7527.750000	38.17	19.49	763.84	-39.75	-26.7
848.970000	7640.646667	37.67	19.66	735.36	-40.05	-27.1
824.040000	8240.288336	38.83	20.6	936.48	-37.95	-25
836.400000	8364.150000	38.83	20.81	959.4	-37.75	-24.8
848.970000	8489.616667	38.33	21.03	928.97	-38.05	-25

Fundamental Emissions (As previously shown on page 7)

g98b0376: 1998-Nov-23 Mon 12:00:00

STATE: 2:High Power

AMPS MODE:

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	METER, dBuV/m	CF, dB	uV/m @ 3m	ERP, dBm	ERP, Watts
824.040000	824.038000	95.29	30.66	1983809.66	28.55	0.716
836.400000	836.400000	95.86	30.69	2125690.35	29.15	0.822
848.970000	848.968000	95.08	30.73	1952090.73	28.45	0.700

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NAME OF TEST: Frequency Stability (Temperature Variation)

SPECIFICATION: 47 CFR 2.1055(a)(1)

GUIDE: EIA/IS-19-B-1988
TIA/EIA/IS-137-A-1996

TEST CONDITIONS: As Indicated

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

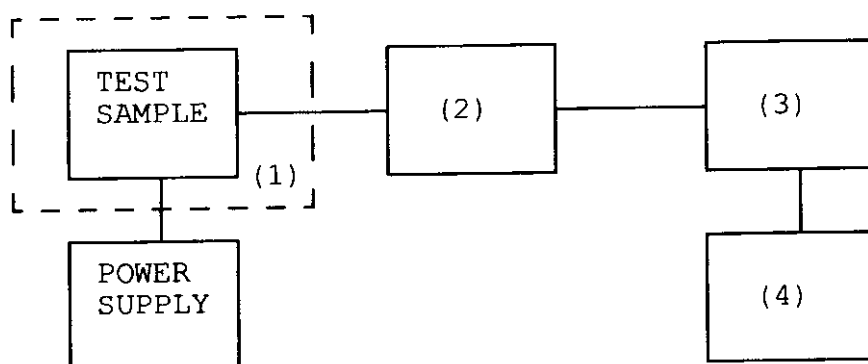
1. The EUT and test equipment were set up as shown on the following page.
2. With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
3. With power OFF, the temperature 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

PAGE NO.

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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



Asset	Description	s/n
-------	-------------	-----

(1) TEMPERATURE, HUMIDITY, VIBRATION

<u>x</u>	i00027	Tenny Temp. Chamber	9083-765-234
---	i00	Weber Humidity Chamber	
---	i00	L.A.B. RVH 18-100	

(2) COAXIAL ATTENUATOR

<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) R.F. POWER

---	i00014	HP 435A POWER METER	1733A05839
<u>x</u>	i00039	HP 436A POWER METER	2709A26776
<u>x</u>	i00020	HP 8901A POWER MODE	2105A01087

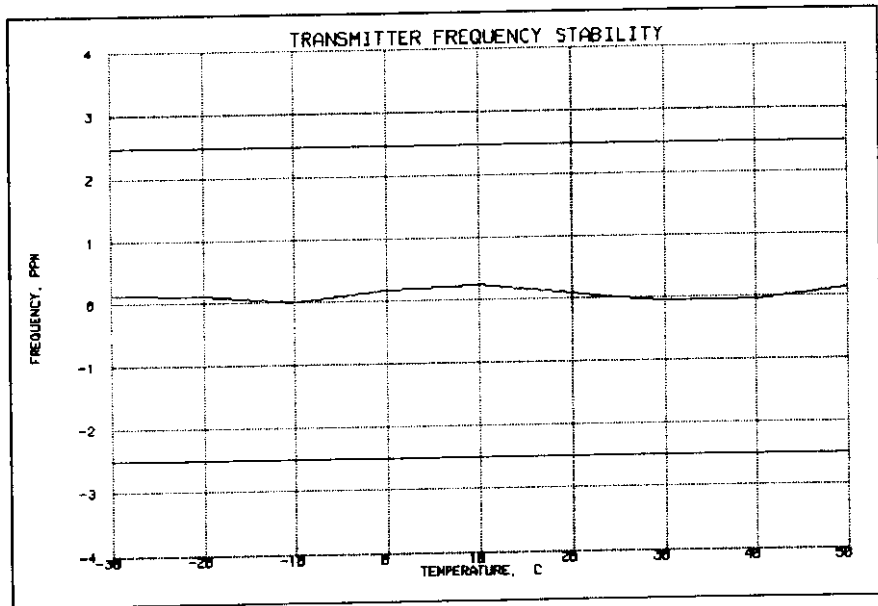
(4) FREQUENCY COUNTER

---	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)
g98b0333: 1998-Nov-24 Tue 12:44:00
STATE: 0:General



SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 30 of 30.

NAME OF TEST: Frequency Stability (Voltage Variation)

SPECIFICATION: 47 CFR 2.1055 (b) (1)

GUIDE: EIA/IS-19-B-1988
TIA/EIA/IS-137-A-1996

TEST EQUIPMENT: As per previous page

MEASUREMENT PROCEDURE

1. The EUT was placed in a temperature chamber at $25 \pm 5^\circ\text{C}$ 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.

RESULTS: Frequency Stability (Voltage Variation)

g98b0380: 1998-Nov-24 Tue 12:43:42

STATE: 0:General

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

M. Flom P. Eng.

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.

STATEMENT OF QUALIFICATIONS

EDUCATION:

1. B. ENG. in ENGINEERING PHYSICS, 1949, McGill University, Montreal Canada.
2. Post Graduate Studies, McGill University & Sir George Williams University, Montreal.

PROFESSIONAL AFFILIATIONS:

1. ARIZONA SOCIETY OF PROFESSIONAL ENGINEERS (NSPE), #026 031 821.
2. ORDER OF ENGINEERS (QUEBEC) 1949. #45 34.
3. ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOPHYSICISTS & GEOLOGISTS OF ALBERIA #5916.
4. REGISTERED ENGINEERING CONSULTANT - GOVERNMENT OF CANADA, DEPARTMENT OF COMMUNICATIONS. Radio Equipment approvals.
5. IEEE, Lifetime member no. 041/204 (Member since 1947).

EXPERIENCE:

1. Research/Development/Senior Project Engineer. R.C.A. LIMITED (4 years).
2. Owner/Chief Engineer of Electronics. Design/Manufacturing & Cable TV Companies (10 years)
3. CONSULTING ENGINEER (over 25 years).



MORTON FLOM, P. Eng.

MFA **M. Flom Associates, Inc. - Global Compliance Center**
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85224-1571
www.goodnet.com/~mflom, (602) 926-3100, FAX: 926-3598

Date: December 7, 1998

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-6832
FCC ID: NBZNRM-6832
FCC Rules: 1.1310, 22(h)
and 47 CFR 1.1307, Environmental Assessment

Gentlemen:

On behalf of the Applicant, enclosed please find the Supplemental Test Data Report and all pertinent documentation, the whole for Environmental Assessment of the referenced equipment as shown.

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

MFA **M. Flom Associates, Inc. - Global Compliance Center**
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85224-1571
www.goodnet.com/~mflom, (602) 926-3100, FAX: 926-3598

Sub-part
1.1307:

SUPPLEMENTAL REPORT

ENVIRONMENTAL ASSESSMENT

General Population / Uncontrolled Exposure,
Maximum Permissible Exposure
and Specific Absorption Rate

EQUIPMENT IDENTIFICATION

Novatel Wireless Technologies Ltd.
FCC ID: NBZNRM-6832

DATE OF REPORT

December 7, 1998

SUPERVISED BY:


Morton Flom, P. Eng.

(THE FOLLOWING WILL BE PLACED IN INSTRUCTION MANUAL)

INSTRUCTIONS TO INSTALLERS & USERS

Minimum Safe 0.1185 m (4.7 inches)
Distance

Antenna Mounting Antenna as supplied by manufacturer must not be mounted at a location such that any person or persons can come closer than the above-indicated minimum safe distance to the antenna.

Antenna Do not substitute any antenna for the one
Substitution supplied by manufacturer. You may be exposing person(s) to harmful radiation. Contact supplier or manufacturer for further instructions.

TABLE OF CONTENTS

<u>RULE</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
	Test Report	1
	Identification of the Equipment Under Test	2
	Standard Test Conditions and Engineering Practices	3
1.1310	Environmental Assessment	4

PAGE NO.

2 of 6.

IDENTIFICATION OF THE EQUIPMENT UNDER TEST (EUT)NAME AND ADDRESS OF APPLICANT:

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

VENDOR:

Applicant

FCC ID:

NBZNRM-6832

MODEL NO:

NRM-6832

DESCRIPTION:

CDPD Modem Module

TYPE OF EMISSION:

28K8FXW

FREQUENCY RANGE, MHz:

824 to 849

POWER RATING, Watts:

0.006 to 0.6
___ Switchable ___ Variable ___ N/A

MODULATION:

___ x AMPS
___ TDMA
___ CDMA
___ OTHER

ANTENNA:

___ HELICAL
___ x MONOPOLE
___ OTHER

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.

PAGE NO. 4 of 6.

Name of test: Environmental Assessment

Specification: FCC: 47 CFR 1.1310

Measurement Guide: ANSI/IEEE C95.1 1992

Test Equipment: Maximum Permissible Exposure (MPE)
measurement system, consisting of:
Narda 8717-1174R, Radiation meter
Narda 8761D, E-field probe (300 kHz - 3 GHz)
(Calibrated Nov-98)

Measurement Procedure:

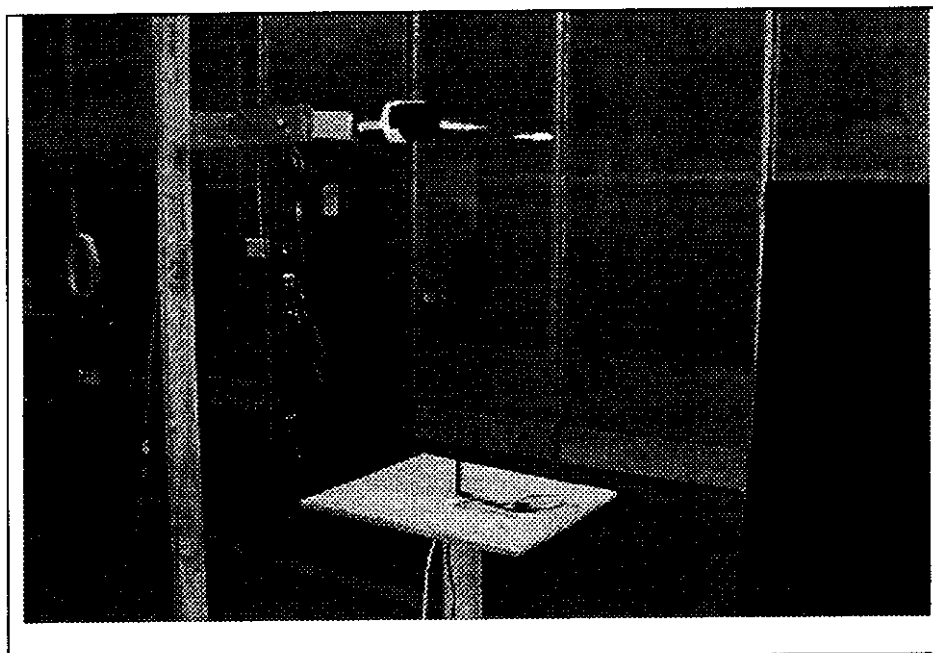
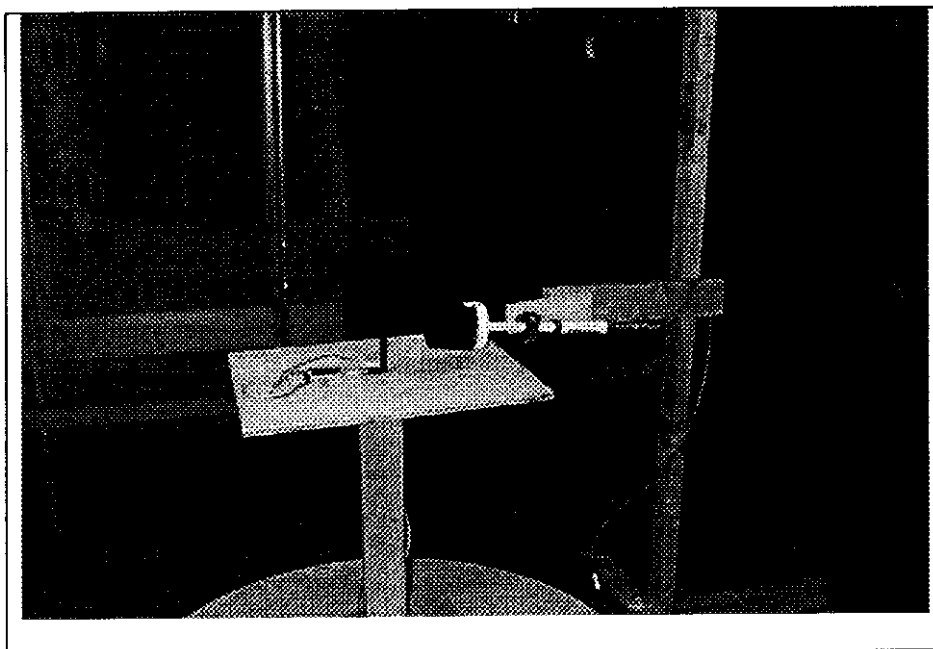
1. The following measurements were performed with a Narda probe using ANSI/IEEE C95.1 as a guide.
2. Prior to making any measurements, the measurements system was calibrated in accordance with the manufacturer's procedures.
3. The EUT's radiating element (antenna) was placed on a 1 m tall table for ease of testing. For equipment normally operated on a metal surface, a ground plane was used.
4. The remaining equipment necessary to operate the EUT was maintained at a distance from the measurement arrangement suitable to minimize interference with the measurements.
5. The minimum safe distance was calculated from the formula $\text{Power Density} = \text{EIRP} / 4\pi R^2$ (Peak Watts/m²). The calculation is shown with the measurement data.
6. With the EUT operating at maximum power, a search was initiated for worst case emissions with the probe raised and lowered over a range of 0.2 to 2 meters in height and over a horizontal plane of 0° to 360°.
7. Average values were calculated for the whole body (0.2-2.0m), lower body (0.2-0.8m) and upper body (1.0-2.0m).

Results: Attached.

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Test setup:



PAGE NO.

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Name of test:

Environmental Assessment

Rated Probe Power

Narda 8761D Probe = $10 \mu\text{W}/\text{cm}^2$ to $20 \text{ mW}/\text{cm}^2$

Density:

Error Margin:

Narda 8717 Meter = 1%

EUT Description:

See Page 2.

Power[W ERP]

= 0.6

Test Frequency, MHz

= 836.4

Ant. Gain[dBi]

2.15 dBi

Power[W EIRP]

 $P[W \text{ ERP}] \times 10^{(2.15/10)}$, Watts EIRP = 0.984

MPE Limit

 $f/1500 = 0.5576 \text{ mW}/\text{cm}^2$

(at test frequency)

 $= 5.576 \text{ W}/\text{m}^2$ Theoretical safe distance: $R_{[m]} = [(P[W \text{ EIRP}]) / (4\pi \times \text{Limit}_{[W/\text{m}^2]})]^{1/2}$ $R_{[m]} = [0.984 / (4\pi \times 5.576)]^{1/2} = 0.1185$ $R_{[\text{inches}]} = 4.7$

Results:

at theoretical safe distance

Probe Height, m	Power Density, mW/cm^2
2.0	0.12
1.8	0.14
1.6	0.14
1.4	0.17
1.2	0.20
1.0	0.27
0.8	0.16
0.6	0.065
0.4	0.071
0.2	0.063

Calculations:

The measured power density readings were summed and the results divided by the number of readings to calculate the average.

For whole body:

Average of 0.2 to 2.0 m, $\text{mW}/\text{cm}^2 = 0.1419$

For lower body:

Average of 0.2 to 0.8 m, $\text{mW}/\text{cm}^2 = 0.08975$

For upper body:

Average of 1.0 to 2.0 m, $\text{mW}/\text{cm}^2 = 0.177$

Morton Flom, P. Eng.

SUPERVISED BY:

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.

TCP Suspension Enable

Description:

This allows any TCP session to be suspended.

Format:

AT#TCPX?
AT#TCPX=0 or 1

Query TCP suspend enable
Enable/Disable TCP suspend

Validity:

Other Considerations:

Related Topics:

Answer

Description:

This feature represents of the normal ATA answer command. In this system, the ATA will be sent by the host to release any pending push messages, which would have asserted the Ring Indication line of the modem interface.

Format:

ATA

To answer a Ring Indication

Validity:

Other Considerations:

Related Topics:

Telnet Echo

Description:

A command to assist in Telnet terminal emulation. This command and the associated S register determine how characters are echoed, either locally, remotely or with no echo.

Format:

ATS60?	Queries echo mode
ATS60=0	No echo
ATS60=1	Local echo (default)
ATS60=2	Remote echo

Validity:

Other Considerations:

Related Topics:

Fixed Parameters

The following behaviors are fixed for the NRM.

BEHAVIOR	SETTING	Equivalent AT command
Online Mode Echo	Disabled	ATF0
Quiet Mode	Disabled	ATQ0
Extended Result Codes	Enable all	ATX2
Transmit Control	Automatic timed	AT\T1
Subscriber Identity	NRM supports only one NEI.	AT\S0

