

MFA **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

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

Attention of: Mervin Coleman, Director for Advanced
Technology
(403) 295-4813; FAX: -4801

Equipment: NRM-6831 "Merlin"
FCC ID: NBZNRM-6831
P.O. Number: NW52254
FCC Rules: 1.1310 (MPE)

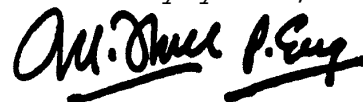
Gentlemen:

Enclosed please find your copy of the Supplemental Test Data Report, the whole for Environmental Assessment (MPE) of the referenced equipment as shown.

Please allow from 6-8 weeks to hear from the Commission, who may request additional data or information, and even a sample for pre-grant audit testing.

Should you need any clarification, just fax or phone. Thank you again for this order - it has been a pleasure to be of service.

Sincerely yours,



Morton Flom, P. Eng.

enclosure(s)
MF/cvr



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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
FCC Rules: 1.1310 (MPE) and 47 CFR 1.1307,
Environmental Assessment

Gentlemen:

On behalf of the Applicant, enclosed please find the Supplemental Test Data Report, the whole for Environmental Assessment (MPE) 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,

A handwritten signature in black ink, appearing to read 'M. Flom P. Eng.', written in a cursive style with a horizontal line underneath.

Morton Flom, P. Eng.

enclosure(s)
cc: Applicant
MF/cvr

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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-6831

DATE OF REPORT

April 23, 1999

SUPERVISED BY:




Morton Flom, P. Eng.

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

- a) TEST REPORT (SUPPLEMENTAL)
- 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: d9940062
- 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.

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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

MANUFACTURER:

Sanmina Canada ULC
 675 - 9th Street NE
 Calgary, AB
 Canada T2E 8R9

FCC ID:

NBZNRM-6831

MODEL NO:

NRM-6831 "Merlin"

DESCRIPTION:

Cellular Data Packet Radio
 Module

TYPE OF EMISSION:

40K0F2D

FREQUENCY RANGE, MHz:

824.04 to 848.97

POWER RATING, Watts:

0.006 to 0.6

 x Switchable ___ Variable ___ N/A

MODULATION:

___ AMPS
 ___ TDMA
 ___ CDMA
 x GMSK

ANTENNA:

___ HELICAL
 x MONOPOLE
 ___ OTHER

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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: 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.

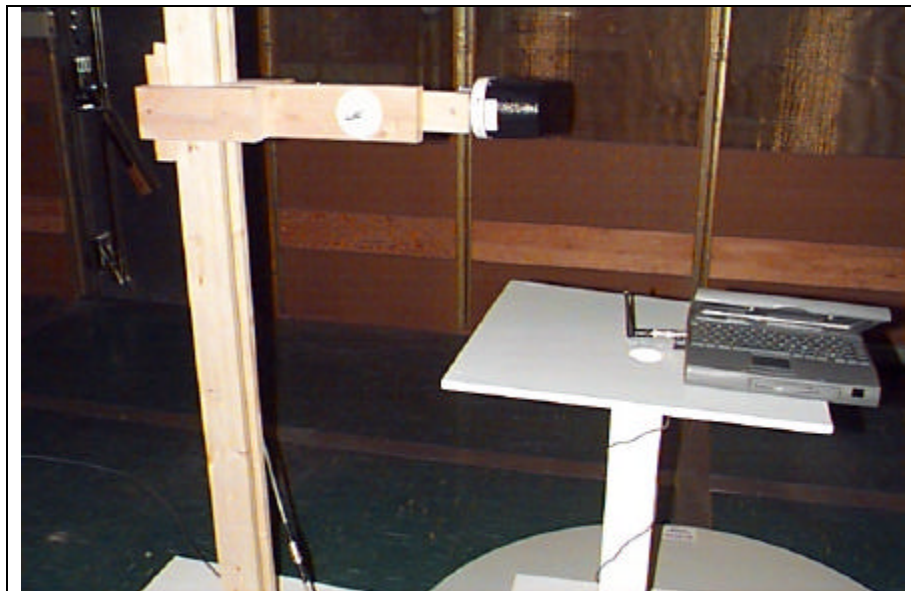
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TEST SETUP: Maximum Permissible Exposure (MPE)
g9940061: 1999-Apr-13 Tue 15:07:46
STATE: 0:General



TEST SETUP: Maximum Permissible Exposure (MPE)
g9940062: 1999-Apr-13 Tue 15:07:46
STATE: 0:General



PAGE NO. 6 of 7.

Name of test: Environmental Assessment

Tested Distance: = 110 mm

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

Error Margin: Narda 8761D E-field probe = 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] = $P_{[W ERP]} \times 10^{(2.15/10)}$, Watts EIRP = 0.448

MPE Limit _[w/m²] (at test frequency) = 5.58

Theoretical safe distance: $R_{[m]} = [(P_{[W EIRP]}) / (4\pi \times \text{Limit}_{[w/m^2]})]^{1/2}$
 $R_{[m]} = [4.9 / (4\pi \times 5.72)]^{1/2} = 0.118$
 $R_{[inches]} = 4.65$

Results:
at theoretical safe distance

Probe Height, m	Power Density, mW/cm ² at 11 cm
2.0	0.019
1.8	0.021
1.6	0.015
1.4	0.020
1.2	0.018
1.0	0.046
0.8	0.046
0.6	0.024
0.4	0.020
0.2	0.022

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

Tested at 11 cm
 For whole body: Average of 0.2 to 2.0 m, $\text{mW}/\text{cm}^2 = 0.047$
 For lower body: Average of 0.2 to 0.8 m, $\text{mW}/\text{cm}^2 = 0.028$
 For upper body: Average of 1.0 to 2.0 m, $\text{mW}/\text{cm}^2 = 0.023$

SUPERVISED BY:

Morton Flom, P. Eng.

PAGE NO. 7 of 7.

Name of test: Environmental Assessment

Tested Distance: = 200 mm

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

Error Margin: Narda 8761D E-field probe = 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] $P_{[W ERP]} \times 10^{(2.15/10)}$, Watts EIRP = 0.448

MPE Limit _[w/m²] 5.58
(at test frequency)

Theoretical safe distance: $R_{[m]} = [(P_{[W EIRP]}) / (4\pi \times \text{Limit}_{[w/m^2]})]^{1/2}$
 $R_{[m]} = [4.9 / (4\pi \times 5.72)]^{1/2} = 0.118$
 $R_{[inches]} = 4.65$

Results:	Probe Height, m	Power Density, mW/cm^2
at theoretical safe distance	2.0	0.015
	1.8	0.018
	1.6	0.019
	1.4	0.025
	1.2	0.024
	1.0	0.042
	0.8	0.100
	0.6	0.025
	0.4	0.022
	0.2	0.020

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, $\text{mW}/\text{cm}^2 = 0.031$

For lower body: Average of 0.2 to 0.8 m, $\text{mW}/\text{cm}^2 = 0.042$

For upper body: Average of 1.0 to 2.0 m, $\text{mW}/\text{cm}^2 = 0.024$

SUPERVISED BY:

Morton Flom, P. Eng.

Addendum:

(THE FOLLOWING WILL BE PLACED IN INSTRUCTION MANUAL)

INSTRUCTIONS TO INSTALLERS & USERS

Minimum Safe Distance 20 cm (7.9 in.)

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

WARNING: **MAINTAIN SEPARATION DISTANCE FROM ANTENNA OF 20 cm.**

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.