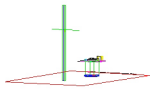
PCTEST ENGINEERING LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6554
http://www.pctestlab.com



RF EXPOSURE EVALUATION
(MAXIMUM PERMISSIBLE EXPOSURE)

Applicant Name:
Novatel Wireless Inc.
9645 Scranton Road, Suite 205
San Diego, CA 92121-3030
United States

Date of Testing:
September 22, 2010
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1009131542.PKR

FCC ID:	**PKRNVWE362**
APPLICANT:	**Novatel Wireless Inc.**

EUT Type:	850/1900 GSM/GPRS/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Module
FCC Rule Part(s):	FCC Part 1 (§1.1310) and Part 2 (§2.1091)
FCC Classification:	PCS Licensed Transmitter (PCB)
Test Procedure:	OET Bulletin 65

The device bearing the FCC Identifier specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in FCC OET Bulletin 65 (See Test Report). These measurements were performed with no deviation from the standards. Test results reported herein relate only to the item(s) tested.

I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

TABLE OF CONTENTS

1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Introduction

This document is prepared on behalf of Novatel Wireless Inc. to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations and RSS-102 of Industry Canada.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310 and RSS-102: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	…	…	f/300	6
1500-100,000	…	…	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

Table 1-1. Limits for Maximum Permissible Exposure (MPE)

1.2 EUT Description

The **Novatel 850/1900 GSM/GPRS/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Module FCC ID: PKRNVWE362** is capable of transmitting in either CDMA/EvDO or LTE mode. Simultaneous transmission of signals using both CDMA/EvDO and LTE technologies is not possible. For this MPE evaluation the RF exposure is determined by calculating the maximum permissible antenna gain based on the maximum transmitter conducted power in CDMA/EvDO and LTE modes.

EUT:

Model:	E362
Grantee:	Novatel Wireless Inc.
FCC ID:	PKRNVWE362

1.3 MPE Requirements Overview

Three different categories of transmitters are defined by the FCC in OET Bulletin 65. These categories are fixed installation, mobile, and portable and are defined as follows:

- **Fixed Installations:** fixed location means that the device, including its antenna, is physically secured at a permanent location and is not able to be easily moved to another location. Additionally, distance to humans from the antenna is maintained to at least 2 meters.

- **Mobile Devices:** a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located, such as a wireless modem operating in a laptop computer, are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR §2.1091.

- **Portable Devices:** a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. Portable device requirements are found in Section 2.1093 of the FCC's Rules (47 CFR§2.1093).

The FCC also categorizes the use of the device as based upon the user's awareness and ability to exercise control over his or her exposure. The two categories defined are Occupational/ Controlled Exposure and General Population/Uncontrolled Exposure. These two categories are defined as follows:

- **Occupational/Controlled Exposure:** In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program. If appropriate, warning signs and labels can also be used to establish such awareness by providing prominent information on the risk of potential exposure and instructions on methods to minimize such exposure risks.

- **General Population/Uncontrolled Exposure:** The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

The **Novatel 850/1900 GSM/GPRS/EDGE/WCDMA/CDMA/EvDO and 700MHz LTE Module FCC ID: PKRNVWE362** is evaluated to the Mobile Device requirements and is considered a device to be used by the General Population/Uncontrolled Exposure.

1.4 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements.

The power generated by each transmitter used in this product was initially measured by a power meter and the powers were recorded. Through use of the Friis transmission formula, the power density level is calculated at a distance of 20cm with knowledge of the maximum permissible antenna gain and the highest conducted output power stated in the tune up procedure. For transmission below 1.5GHz, the maximum permissible antenna gain is limited by the frequency-dependent power density limit at 20cm. For cellular band transmission, the source-based time-averaged output power is based on 2 slot operation in GPRS mode transmitting at the maximum tunable power indicated in the tune-up procedure. The maximum permissible antenna gain still ensures compliance with the 7W ERP (11.46W EIRP) limit specified in Part 22. For transmission above 1.5GHz, the maximum permissible antenna gain is limited by the 2W EIRP limit specified in Part 24.

Friis Transmission Formula

Friis transmission formula: $P_d = (P_{out}*G) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm^2)
P_{out} = output power to antenna (mW)
G = gain of antenna in linear scale
π = 3.1416
R = distance between observation point and center of the radiator (cm)

Calculated MPE

The power density limit for General Population/Uncontrolled Exposure at each frequency is determined based on the information in Table 1-1.

There is no co-location between the electric fields of any two transmitters therefore following power densities are calculated for each individual transmitter by frequency at 20cm spacing:

Frequency	779.5	MHz	
Limit	0.520	mW/cm^2	
Distance (cm), R =	20	cm	
Power (dBm), P =	24.25	dBm	266.07 mW
TX Ant Gain (dBi), G =	9.92	dBi	
Power Density (S) =	**0.520**	mW/cm^2	(at 20cm)
Minimum Distance =	**20.0**	cm	

Table 1-2. Calculated MPE Data for LTE Band 13

Frequency:	824.2	MHz	
Limit:	0.549	mW/cm^2	
Distance (cm), R =	20	cm	
Power (dBm), P =	33	dBm	1995.26 mW
Source-Based TA, Psb =	26.98	dBm	498.82 mW
TX Ant Gain (dBi), G =	7.42	dBi	
Power Density (S) =	**0.5479**	mW/cm^2	(at 20cm)
Minimum Distance =	**20.0**	cm	

Table 1-3. Calculated MPE Data for Cellular Band

Frequency	1909.8	MHz	
Limit	1.000	mW/cm^2	
Distance (cm), R =	20	cm	
Power (dBm), P =	30	dBm	1000.00 mW
TX Ant Gain (dB), G =	3	dBi	
Power Density (S) =	**0.397**	mW/cm^2	(at 20cm)
Minimum Distance =	**12.6**	cm	

Table 1-4. Calculated MPE Data for PCS Band

1.5 Summary of Results

Frequency Band [MHz]	Maximum Antenna Gain [dBi]	MPE @ 20cm (mW/cm^2)	Test Result
779.5 – 784.5	9.92	0.520	PASS
824.2 – 848.8	7.42	0.5479	PASS
1850.2 – 1909.8	3.0	0.397	PASS

Table 1-5. Maximum Permissible Exposure Summary Table

2.0 CONCLUSION

The device meets the mobile RF exposure limit at a 20cm separation distance as specified in §2.1091 of the FCC Rules and Regulations and Health Canada Safety Code 6. An appropriate RF exposure compliance statement will be placed in the user's manual.