



RF Exposure Report

MC760

Equipment:	MC760 USB Modem
Trade Name:	Novatel MC760
Model No:	MC760
FCC ID:	PKRNVWMC760
Filing Type:	Modular Grant
Applicant:	Novatel Wireless Inc. 9645 Scranton Road San Diego, California 92121

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REVISION HISTORY

Rev.	Date	Brief Description of Change	Originator	Approved by
1	13-04-10	Initial Revision	JT	PCTEST Inc.
2	20-04-10	Revised Gain figures for antenna, §1.5 (b)	JT	PCTEST Inc.

1.0 Introduction

This report has been issued to show compliance of the Novatel Wireless MC760 to the FCC Maximum Permissible Exposure limits as specified in CFR 47 §1.1310 and ERP limits in §2.1091 when using the external antenna port and defined as Mobile equipment. The MC760 is a Cellular/PCS + EV-DO/A USB modem.

The MC760 is defined as a Mobile configuration as per the FCC Rules, and the user documentation that is available to consumers indicates that the modem must not be used closer than 20 cm to the head or body to ensure safe operation of the device. The maximum gain of an external antenna connected to the antenna port has been defined in the user documentation as 6.8 dBi in the Cellular Band and 9.9 dBi in the PCS Band.

1.1. FCC Definitions

As per OET Bulletin 65, three (3) categories of transmitters are defined, these are:

a) **Fixed Installation** – Defined as a fixed location for the transmitter and its antenna that is physically secured at a permanent location and cannot easily be moved. Typical user distance to the transmitting antenna is ≥ 2 meters.

b) **Mobile Installation** – A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term “fixed location” means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

c) **Portable Installation** - 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.

The FCC categorizes the use of any device based upon the users awareness and ability to exercise control over exposure. The definitions of exposure categories are as follows:

a) **Occupational/Controlled Exposure** – Applicable to situations where the end users are exposed to RF energy during routine daily workplace conditions and are fully aware of said exposure.

b) **General Population/Uncontrolled Exposure** – Applicable to situations where the end users do not have an awareness of the potential exposure to RF energy or have no control of said exposure.

For purposes of this investigation, the MC760 is evaluated using the exposure limits for General Population/Uncontrolled Exposure.

1.2. MPE Calculation Formula

Per FCC §1.1310, the Power Density limit for General Population/Uncontrolled Exposure is:

- For the Cellular Band – 0.558 mW/cm²
- For the PCS Band – 1.000 mW/cm²

The calculation is made using the Friis transmission equation:

$$S = \text{EIRP}/4\pi R^2$$

Where:

S = Power Density

EIRP – Effective Isotropic Radiated Power

R = 20 cm distance

1.3. EUT Information

Equipment Under Test: Novatel MC760

Hardware Revision: 1.0

Firmware/Software Revision: 1B

Serial Number: N/A (Production Grade Sample)

1.4. Operational Summary

The MC760 is capable of transmitting in the Cellular/PCS frequency bands and features EV-DO modulation schemes for WWAN. For purposes of this report, MPE figures for the MC760 operating in the worst case (highest power) mode is presented per frequency band.

1.5 .MPE Figures

Maximum Antenna Gain = 6.8 dBi

a) Maximum Conducted RF Power Cellular Band:

Channel 1013: 24.88 dBm

$$24.88 \text{ dBm} + 6.8 \text{ dBi (antenna)} = 31.68 \text{ dBm}$$

$$31.68 \text{ dBm} = 1472.3 \text{ mW}$$

Maximum EIRP (mw)	Calculated RF Exposure D = 20 cm	Limit (mW/cm ²)
1472.3	0.293 mW/cm ²	0.558

b) Maximum Conducted RF Power PCS Band:

Maximum Antenna Gain = 8.5 dBi

Channel 600: 24.45 dBm

$$24.45 \text{ dBm} + 8.5 \text{ dBi (antenna)} = 32.95 \text{ dBm}$$

$$32.95 \text{ dBm} = 1972.42 \text{ mW}$$

Maximum EIRP (mw)	Calculated RF Exposure D = 20 cm	Limit (mW/cm ²)
1972.42	0.392 mW/cm ²	1.00

1.6 Environmental Evaluation for RF Exposure

Per §2.1091 devices that operate below 1.5 GHz and have an ERP of 1.5 Watts or greater and devices that operate above 1.5 GHz that have an ERP of greater than 3.0 Watts are subject to RF Exposure evaluation prior to equipment authorization or use. Devices that are below these ERP levels are categorically excluded from RF Exposure evaluation.

2.0 Conclusion

As presented in the previous section, the MC760 complies with all requirements for Maximum Permissible Exposure per CFR 47 §2.1091, defined as Mobile equipment with a minimum separation distance between the end user and the antenna(s) of 20cm and complies with RF Exposure limits per §1.1310.