



HEXAGON
POSITIONING INTELLIGENCE



Maximum Permissible Exposure Report

SMART 7 Family

Equipment: SMART 7
Trade Name: SMART 7-i/SMART7-W/SMART7-SPi
Model No(s): 01019972/01020129/01019990
FCC ID: UTU-01019715
Filing Type: Class 2 Permissive Change
Applicant: NovAtel Inc.
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1.0 Introduction

This report has been issued to show compliance of the NovAtel Inc. SMART 7 family of products to the Maximum Permissible Exposure (MPE) limits as specified in 47 CFR §2.1091. The SMART 7 uses a 3rd party DTS Wi-Fi device operating in the 2400 to 2483.5 MHz band certified per §15.247.

NovAtel Inc. has designed a 3.0 dBi trace antenna requiring assessment of RF Exposure requirements per §1.1310 of the commission's rules.

1.1. FCC Definitions

1.1.1. Transmitter Categories

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 it's antenna that is physically secured at a permanent location and connate 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 easily be 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.

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1.1.2. Exposure Categories

The FCC categorizes the use of any device based upon the user's 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.

1.2 MPE Limit

Per FCC §1.1310, the Power Density limit for General Population /Uncontrolled Exposure is 1.0 mW/cm² in the 2.4 GHz band.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-3.0	614	1.63	100 [†]	30
3.0-30	842/f	2.19/f	180/f ² [†]	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

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1.3 EUT Information

The SMART7 employs a 2.4 GHz RF module manufactured by Redpine Signals®. The highest measured power level per Applied Test Laboratories Inc. test report N001E043-31 is presented below.

Test Data Summary – Output Power with Voltage Variations

Voltage Variations						
Frequency (MHz)	Modulation	6VDC (dBm)	14VDC (dBm)	28VDC (dBm)	36VDC (dBm)	Max Deviation from 14VDC (dB)
2412	1M Data Rate	8.87	8.50	9.21	8.80	0.71

Conversion: **9.2 dBm = 8.34 mW**

Manufacturing Tolerance (2dB): **11.2 dBm = 13.18 mW**

Note: For the purposes of demonstrating compliance to RF Exposure requirements, a duty cycle of 100% is assumed and + 2dB is added to the measured value to account for manufacturing tolerance.

1.4 MPE Calculation

The calculation for Power Density is made using the Friis transmission equation:

$$P_d = (P_{out} * G) / 4 * \pi * R^2$$

Where:

Pd = Power Density in mW/cm^2
Pout = output power to antenna in mW
G = Gain of Antenna (Linear)
Pi = 3.1416
R = Minimum separation from the User = 20 cm – Mobile Device per §2.1091

$$P_d = 13.18 * 3.0 / 4 * 3.1416 * 20^2$$

$$P_d = 0.00786 \text{ mW/cm}^2$$

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2.0 Conclusion

The SMART7 is within the allowable limit for General Population/Uncontrolled Exposure MPE values of 1.0 mW/cm² as defined in FCC §1.1310 for Mobile equipment.

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