Report Number: 05-0231 Issue Date: August 30, 2005
Customer: Nivis, LLC
Model: Amplified Radio Modem RF-P9-05-01-03

RF EXPOSURE INFORMATION

U.S. Technologies, Inc.   FCC
                                                              Part 15 Permissive Change

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5.1 RF Safety Requirements to 2.1091 for Mobile Transmitters

The unit under evaluation has two external antennas. Nivis LLC wishes to co-locate the P9-05-01-03 module with the Nivis LLC CM42 module utilizing the Dual Band PCS Antenna only.

Upon the Original Grant submittal, Nivis LLC originally calculated the MPE emission values for the maximum power density as occurring when using the 1.73 dBi Fractal antenna. They used the formula shown in OET Bulletin 65 and calculated the minimum distance between antenna and unsuspecting user as 20 cm. However, for our calculations, we will use the maximum required for the MACOM Module, which was 23 cm.

The original Data is located below, which actually represents a worse case than the Dual Band PCS antenna applied for in this Permissive Change:

MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB	TYPE OR CONNECTOR
Mobile Antennas				
Nivis	Fractal	**Nivis-Falcon**	1.73 dBd	Soldered to Antenna pad J3
Comtelco	**Dual Band PCS**	**A113182B**	**Unity**	**Reverse SMA**

Fractal Antenna

Power Output

    The EUT's maximum expected output power as shown in Section 2.6 was

Frequency of Fundamental (MHz)	Measurement (dBm)*	Measurement (mW)*	FCC Limit (Watt)
910.447	20.86	121.90	1.0
918.937	21.11	129.12	1.0
927.440	20.88	122.46	1.0

* Measurement includes 0.1 dB for cable loss

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5.1 RF Safety Requirements to 2.1091 for Mobile Transmitters – Cont.

The maximum EIRP expected for mobile installations is with the +3.92 dBi gain Fractal antenna. This would yield a maximum EIRP of 21.11 dBm + 3.92 dBi = +25.03 dBm.

(The Comtelco Dual Band PCS antenna has a unity gain, therefore maximum EIRP is less.)

The maximum EIRP for mobile installations may be expected to be

Antilog (25.03 dBm/10) = 318.42 mW

MPE Calculations

The limits for this unit (uncontrolled exposure) are f/1500 = 910.5/1500 = .607 mW/cm^2. Taking the RF Denisty Field Equation:

Mobile Installations

$S = 318.42/4 * \pi * 23^2$

$S = 318.42/6647.61$

$S = .048$ mW / cm^2

$\% = (.048/.607) \times 100 = 7.9 \%$

Located on the next page of this section is the Output Power excerpt from the Original Grant Application of the M/A-COM CM42, FCC ID# AXATR-423-A2, granted 7/15/2004 of which the Nivis CM42 module was derived for the Change of ID.

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5.1 RF Safety Requirements to 2.1091 for Mobile Transmitters – Cont.

Excerpt from Application **AXATR-423-A2**

5.4   POWER OUTPUT TEST DATA- §2.1046

TABLE 5-3: POWER OUTPUT DATA - §2.1046
(800MHZ AMPS Mode)

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (High Power) (dBm)	EUT Conducted Power (Low Power) (dBm)
991	824.04	34.43	24.3
383	836.49	34.21	24.0
799	848.97	34.31	24.0

(800 MHz CDMA mode)

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (dBm)
1013	824.70	24.55
400	837.00	24.52
777	848.31	24.72

(1900 MHz PCS CDMA mode)

Channel Number	Frequency Tuned (MHz)	EUT Conducted Power (dBm)
25	1851.25	24.27
575	1878.75	24.08
1175	1908.75	24.56

For the frequency range 824-849 MHz :

The established limit calculation for 824 MHz is $824/1500 = 0.549$ mW / cm^2
The measured out put power is 34.43 dBM + 0 dBi (Unity Gain Antenna) = 34.43 dBm

The maximum EIRP for mobile installations may be expected to be

Antilog (34.43 dBm/10) = 2,773.32 mW

MPE Calculations

The limits for this unit (uncontrolled exposure) are 0.549 mW/cm^2. Taking the RF Denisty Field Equation:

Mobile Installations

$S = 2,773.32/4*\pi* 23^2$

$S = 2,773.32/6647.61$

$S = 0.417$ mW / cm^2

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% = (0.417/0.549) x 100 = 76%

Adding the 2 worse case values of RF Exposure of each Module, in percentage of the limit

S(total %) = S(P9 Module %) + S(CDMA Module %)

S(total %) =7.9 %+ 76%

S(total) = 83.9 %

This value for both modules is well below the 100 % limit for 824 MHz

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For the frequency range 1850-1910 MHz:

The established limit calculation for 1850 MHz is 1.0 mW / cm^2

The measured out put power is 24.56 dBM + 0 dBi (Unity Gain Antenna) = 24.56 dBm

The maximum EIRP for mobile installations may be expected to be

Antilog (24.56 dBm/10) = 285.76 mW

MPE Calculations

The limits for this unit (uncontrolled exposure) are 1 mW/cm^2. Taking the RF Denisty Field Equation:

Mobile Installations

$S = 285.76/4*\pi* 23^2$

$S = 285.76/6647.61$

$S = 0.043$ mW / cm^2

$\% = (0.043/1)$ x 100 = 4.3%

Adding the 2 worse case values of RF Exposure of each Module, in percentage of the limit

S(total %) = S(P9 Module %) + S(CDMA Module %)

S(total %) = 7.9 %+ 4.3%

S(total) = 12.2 %

This value for both modules is well below the 100 % limit for 1850 MHz