RF EXPOSURE INFORMATION

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 SGM48 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.

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

Nivis LLC will sell the RF-P9-05-01-03 with one of the following antennas.

MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB	TYPE OR CONNECTOR
Mobile Antennas				
Nivis	Fractal	Nivis-Falcon	1.73 dB	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

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

The maximum EIRP expected for mobile installations is with the +1.73 dBi gain Fractal antenna. This would yield a maximum EIRP of 20.86 dBm + 1.73 dBi = +22.59 dBm.

(The Comtelco Dual Band PCS antenna has a unity gain, therefore maximum EIRP is 21.02, as detailed in Table 3a.)

The maximum EIRP for mobile installations may be expected to be

Antilog (22.59 dBm/10) = 181.6 mW

MPE Calculations

The limits for this unit (uncontrolled exposure) are 1.0 mW/cm^2. Taking the RF Denisty Field Equation:

Mobile Installations

$S = 181.6/4*\pi* 20^2$

$S = 181.6/5026.55$

$S = .036$ mW / cm^2

Located on the next page of this section is the excerpt from the Original Grant Application of the Sony Ericsson GSM Module, ID # PY76220501-BV, of which the NivisSGM48 module was derived for the Change of ID.

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

Excerpt from Application **PY76220501-BV**

Prediction of MPE limit at given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01
$S=P*G/4*\pi* R^2$

where:
S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Prediction for GSM 1900 (1850-1910 MHz) Band
Maximum peak output power at antenna input terminal: 31,45 dBm
Maximum peak output power at antenna input terminal: 1396,368 mW
Antenna gain(typical): -1,84 dBi
Maximum antenna gain: 0,654 numeric
Prediction distance: 20 cm
Prediction frequency: 1880 MHz
MPE limit for uncontrolled exposure at prediction frequency: 1 mW / cm^2
Power density at prediction frequency: **0,181680276** mW / cm^2

Prediction for GSM 850 (824-849 MHz) Band
Maximum peak output power at antenna input terminal: 30,47 dBm
Maximum peak output power at antenna input terminal: 1114,294 mW
Antenna gain(typical): -1,47 dBi
Maximum antenna gain: 0,713 numeric
Prediction distance: 20 cm
Prediction frequency: 839 MHz
MPE limit for uncontrolled exposure at prediction frequency: 1 mW / cm^2
Power density at prediction frequency: **0,158059086** mW / cm^2

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

S(total) = S(P9 Module) + S(GSM Module)

S(total) =0.036 + 0.182

S(total) =0.218 mW / cm^2

This value for both modules is well below the limit of 1 mW / cm^2