RF EXPOSURE

1. Regulation

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.

Limits for Maximum Permissive Exposure: RF exposure is calculated.

Frequency Range	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm^2]	Averaging Time [minute]
Limits for General Population / Uncontrolled Exposure				
0.3 ~ 1.34	614	1.63	*(100)	30
1.34 ~ 30	824/f	2.19/f	*(180/f2)	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1 500	/	/	f/1 500	30
1 500 ~ 15 000	/	/	1	30

f=frequency in MHz, *= plane-wave equivalent power density

MPE (Maximum Permissive Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad \left(\Rightarrow R = \sqrt{PG/4\pi S}\right)$$

S = power density [mW/cm^2]
P = Power input to antenna [mW]
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 [cm]

2. RF Exposure Compliance Issue

The information should be included in the user's manual:
This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

MPE Calculations : ANT1

- Frequency Range : 903 MHz ~ 926.5 MHz

- Measured RF Output Power (Avg.) : 6.82 dBm

- Target Power & Tolerance 6.00 dBm & ± 2.00 dB

(Maximum : 8.00 dBm & Minimum : 4.00 dBm)

- Maximum Peak Antenna Gain : 4.34 dBi

- Maximum Output Power for the Calculation : 8.00 dBm

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the The MPE calculation for this exposure is shown below.

- EIRP = P + G = 8.00 dBm + 4.34 dBi = 12.34 dBm = 17.14 mW	- NOTE P : Max tuneup Power (dBm) G : Maximum Peak Antenna Gain (dBi)

Power Density at the specific separation

- S = EIRP / (4 X $R^2\pi$) = 17.14 / (4 X 20^2 X π) = **0.003 41** mW/cm^2	- NOTE S : Maximum Power Density (mW/cm^2) EIRP : Equivalent Isotropic Radiated Power (mW) R : Distance to the center of the radiation of the antenna (20 cm)

MPE Calculations : ANT2

- Frequency Range : 903 MHz ~ 926.5 MHz

- Measured RF Output Power (Avg.) : 7.31 dBm

- Target Power & Tolerance 6.00 dBm & ± 2.00 dB

(Maximum : 8.00 dBm & Minimum : 4.00 dBm)

- Maximum Peak Antenna Gain : 4.34 dBi

- Maximum Output Power for the Calculation : 8.00 dBm

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the The MPE calculation for this exposure is shown below.

- EIRP = P + G = 8.00 dBm + 4.34 dBi = 12.34 dBm = 17.14 mW	- NOTE P : Max tuneup Power (dBm) G : Maximum Peak Antenna Gain (dBi)

Power Density at the specific separation

- S = EIRP / (4 X $R^2\pi$) = 17.14 / (4 X 20^2 X π) = **0.003 41** mW/cm^2	- NOTE S : Maximum Power Density (mW/cm^2) EIRP : Equivalent Isotropic Radiated Power (mW) R : Distance to the center of the radiation of the antenna (20 cm)