Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2} \quad \textit{(formula 1)} \qquad PG = \frac{(Ed)^2}{30} \quad \textit{(formula 2)}$$

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

PG = Effective Isotropic Radiated Power (EIRP)
E = Electric field measured at distance R distance
d = measurment distance

Maximum vertical electric field measured at 13,56MHz: 44,8 (dBµV/m)
Maximum horizontal electric field measured at 13,56MHz: 43,6 (dBµV/m)
(see associated FCC application test report)

Total electric field value at 13,56MHz (quadratic sum): 2,30E-04 (V/m)
Measurement distance: 3 (m)
PG: 1,59E-05 (mW) *(formula 2)*

Prediction distance: 20 (cm)
Prediction frequency: 13,56 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 0,978 (mW/cm^2)

§ 1.1310 Radiofrequency radiation exposure limits.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f²)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) 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
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

Power density at prediction frequency: **3,17E-09** (mW/cm^2) *(formula 1)*

MPE limit for uncontrolled exposure at prediction frequency: 0,978 (mW/cm^2)

Power density at prediction frequency for 48 collocated modules: **1,52E-07** (mW/cm^2)

The power density remains very inferior to the limit