

Exhibit 13 RF Exposure

Table 13-1 and Table 13-2 provide an analysis of the maximum permissible exposure (MPE) information for each of the RAFUT antenna configurations. The analysis was performed in reference to FCC OET Bulletin 65. The maximum EIRP power used for the MPE calculation incorporates 1 dB of calibration error and the peak gain to represent the worst case radiated transmit power. The cable losses for each configuration, per table 3-1 and 3-2 of the “Remote Antenna Fixed Phone Installation Instructions” (Exhibit 7), are also included in the calculation. The cable loss for the DRA antenna is 2.7 dB, and the cable loss for the helix antenna is 0.5 dB.

Page 16 and Page 18 of the Remote Antenna Fixed Phone Installation Instructions (Exhibit 7) specifies the minimum separation distances for each antenna to insure FCC RF safety requirements are satisfied. For the DRA antenna, the minimum separation is 53cm (20.9 inches). For the helix antenna, the minimum separation distance is 43cm (17 inches). The separation distances specified in the warning statement of the manual is slightly farther than the calculated distances in order to provide an increased safety margin to the user.

It should be noted that these separation distances were specified in reference to the more stringent IRPA Uncontrolled environment guidelines.

Table 13-1 Passive Dielectric Resonator Assembly (DRA) Antenna MPE Analysis

MPE - Passive-Tx ODU Dielectric Resonator Assembly (DRA) Antenna

References:
 International Radiation Protection Association (IRPA) Guidelines on Protection Against Non-Ionizing Radiation, 1991
 47 CFR Ch.1 (10-1-97 Edition) Part 1, Section 1.1310
 FCC OST Bulletin No. 65, 1985

Max. Antenna Power	=	1585	mW	
	=	32.00	dBm	
libration Error Tolerance	=	1.0	dB	
Minmum Cable Loss		2.3		
Max. Antenna Gain	=	6.5	dBic	
EIRP	=	5248	mW	3184.41 mW
	=	37.20	dBm EIRP	35.03 dBm ERP

1991 IRPA Guidelines Uncontrolled MPE = $f/2000 \text{ mW/cm}^2$; f = frequency in MHz
 1997 FCC Uncontrolled MPE = 1.0 mW/cm^2

Far-Field Power Density Calculations (in phase addition, worst case)

Free Space P.d = $\text{EIRP}/(4 * \pi * r^2)$
 100% Ground Reflection P.d = $\text{EIRP}/(\pi * r^2)$
 Radio Broadcast Towers P.d = $(1.6)^2 * \text{EIRP}/(4 * \pi * r^2)$

IRPA Guideline Uncontrolled MPE Safe Approach Distance

Frequency (MHz)	Wavelength (cm)	Elemental Dipole Far-Field Dist. (cm)	IRPA MPE (mW/cm ²)	Distance to Free Space MPE (cm)	Distance to 100% Ground Reflection MPE (cm)
1610	18.63	2.97	0.805	22.78	45.56
1618	18.54	2.95	0.809	22.72	45.44
1621.35	18.50	2.94	0.811	22.70	45.40
1626.5	18.44	2.94	0.813	22.66	45.32

FCC Uncontrolled MPE Safe Approach Distance

Frequency (MHz)	Wavelength (cm)	Elemental Dipole Far-Field Dist. (cm)	FCC MPE (mW/cm ²)	Distance to Free Space MPE (cm)	Distance to 100% Ground Reflection MPE (cm)
1610	18.63	2.97	1.000	20.44	40.87
1618	18.54	2.95	1.000	20.44	40.87
1621.35	18.50	2.94	1.000	20.44	40.87
1626.5	18.44	2.94	1.000	20.44	40.87

Table 13-2 Passive Quadrifilar Helix Antenna MPE Analysis

MPE - Passive-Tx Quadrifilar Helix Antenna

References:

International Radiation Protection Association (IRPA) Guidelines on Protection Against Non-Ionizing Radiation, 1991
 47 CFR Ch.1 (10-1-97 Edition) Part 1, Section 1.1310

FCC OST Bulletin No. 65, 1985

Max. Antenna Power	=	1585	mW		
	=	32.00	dBm		
libration Error Tolerance	=	1.0	dB		
Minimum Cable Loss	=	0.5			
Max. Antenna Gain	=	4.0	dBic		
EIRP	=	4467	mW	2710.37	mW
	=	36.50	dBm EIRP	34.33	dBm ERP

1991 IRPA Guidelines Uncontrolled MPE = f/2000 mW/cm²; f = frequency in MHz

1997 FCC Uncontrolled MPE = 1.0 mW/cm²

Far-Field Power Density Calculations (in phase addition, worst case)

Free Space P.d = EIRP/(4 * pi * r²)

100% Ground Reflection P.d = EIRP/(pi * r²)

Radio Broadcast Towers P.d = (1.6)² * EIRP/(4 *pi * r²)

IRPA Guideline Uncontrolled MPE Safe Approach Distance

Frequency (MHz)	Wavelength (cm)	Elemental Dipole Far-Field Dist. (cm)	IRPA MPE (mW/cm ²)	Distance to Free Space MPE (cm)	Distance to 100% Ground Reflection MPE (cm)
1610	18.63	2.97	0.805	21.01	42.03
1618	18.54	2.95	0.809	20.96	41.92
1621.35	18.50	2.94	0.811	20.94	41.88
1626.5	18.44	2.94	0.813	20.91	41.81

FCC Uncontrolled MPE Safe Approach Distance

Frequency (MHz)	Wavelength (cm)	Elemental Dipole Far-Field Dist. (cm)	FCC MPE (mW/cm ²)	Distance to Free Space MPE (cm)	Distance to 100% Ground Reflection MPE (cm)
1610	18.63	2.97	1.000	18.85	37.71
1618	18.54	2.95	1.000	18.85	37.71
1621.35	18.50	2.94	1.000	18.85	37.71
1626.5	18.44	2.94	1.000	18.85	37.71