

Power Density Calculation

	G (dBi)	h (m)	Width (m)	A (m ²)	OD (m)	θ (3dB BW Az ^o)	P (W)	S _{surface} (w/m ²)	R _{nf} (m)	S _{nf} (w/m ²)	S _{nfmax} (w/m ²)	R _{ff} (m)	S _{ff} (w/m ²)
Omni 7.5	7.5	0.276			0.0254		0.066	2.9983	0.7760	2.9983	2.9983	0.7760	0.0491
Omni 9	9.0	0.5			0.0400		0.066	1.0510	1.9858	1.0510	1.0510	1.9858	0.0106
Omni 12	12.0	0.83			0.0560		0.066	0.4522	6.5773	0.4522	0.4522	6.5773	0.0019
SEC-5V/H-90-17	17.0	0.65	0.216	0.1404		90	0.066	1.8803	4.0721	0.0040	0.0108	4.0721	0.0159
SEC-5V/H-60-18	18.0	0.65	0.216	0.1404		60	0.066	1.8803	3.4177	0.0047	0.0108	3.4177	0.0284

Where:

G: antenna gain

h: the height of the antenna

A: physical area of the aperture antenna

P: radio output power, P_{max} = 0.066 W

S_{surface}: maximum power density at the antenna surface, S_{surface} = 4P/A, with omni antenna, S_{surface}=P/(2x3.14xODxh)

R_{nf}: extent of near field, R_{nf} = D²/4λ, where λ is wavelength, at 5.8GHz, λ=0.052m;

With omni antenna, R_{nf} is where S_{nf}=S_{ff}; R_{nf}=Gh/2, where G is the antenna gain

With sector antenna, R_{nf} is where S_{nf}=S_{ff}, R_{nf}=θhG/720

S_{nf max}: maximum near field power density,

For panel and parabolic antennas, S_{nf} = 16ηP/πD² (D is the antenna diameter); for worst case situation, η is assumed to be 1

For omni and sector antenna, S_{nf}=180P/(θπh R_{nf})

R_{ff}: distance to beginning of far field; with omni and sector antenna, R_{ff} starts at the point where S_{nf}=S_{ff}

S_{ff}: far field power density (on axis); S_{ff} = PG/4πR²

Note: Power density beyond 1.5m from the center of antenna must be within 10W/m² or 1mW/cm²