Power Density Calculation

	G (dB)	D (m)		A (m^2)	P (W)*	$S_{surface}$ (w/m2)	$R_{nf\ (m)}$	S_{nfmax} (w/m^2)	$R_{ff\ (m)}$	$S_{t\ max}$(w/m^2)	S_{ff}(w/m^2)
1' Panel	23.9	0.4310		0.0929	0.050	2.1528	0.8978	1.3708	2.1434	0.6153	0.1952
2' parabolic	30.1	0.6096		0.2917	0.050	0.6856	1.7961	0.6853	4.2878	0.6154	0.1602
4' parabolic	35.3	1.2192		1.1669	0.050	0.1714	7.1845	0.1713	17.1513	0.1713	0.0349
6' parabolic	38.1	1.8288		2.6254	0.050	0.0762	16.1651	0.0761	38.5905	0.0761	0.0167

Where:

G: antenna gain

D: antenna diameter in meters, for panel antenna, D = 1.414x the side length of the antenna

P: radio output power fed into the antenna

A: physical area of the aperture antenna

$S_{surface}$: maximum power density at the antenna surface, $S_{surface} = 4P/A$

R_{nf}: extent of near field, $R_{nf} = D^2/4\lambda$, where λ is wavelength, at 5.8GHz, λ=0.052m;

S_{nfmax}: maximum near field power density, $S_{nf} = 16\eta P/\pi D^2$; for worst case situation, η is assmumed to be 1

R_{ff}: distance to beginning of far field; $R_{ff} = 0.6D^2/\lambda$

$S_{t\ max}$: maximum powre density in the transition region; $S_{t\ max} = S_{nf} * R_{nf}/R_{min}$; where R_{min} = min (2m, R_{nf})

S_{ff}: far field power density (on axis); $S_{ff} = PG/4\pi R^2$

Note: Power density beyond 2m from the center of antenna must be within 10W/m^2 or 1mW/cm^2