

NTIA Redbook Section 8.3.27 Item f - Link Budget Calculations

https://www.ntia.doc.gov/files/ntia/publications/redbook/2017-09/8_17_9.pdf

$$P_{Tmax} = P_R + 20 \log_{10} f + 20 \log_{10} (30+d) - 27.55$$

where:

P_R is the power received at 30 meters from the building (i.e. -140 dBm/24 MHz)

f is frequency in MHz (i.e. 1575.42 for L1, 1227.60 for L2, 1176.45 for L5)

Distance between the radiator and the closest exterior wall of the building in feet

d is the distance between the radiator and the closest exterior wall of the building in meters.

P_{Tmax} is the maximum permissible EIRP in dBm

P_{Tmax} can then be converted to picowatts by using the formula $P_{Tmax(pW)} = 10^{(P_{Tmax}/10 + 9)}$

Distance to Range, m

GLI Metro Configuration Set to - ERP dBm

GLI Metro Configuration Set to - ERP pW

GLI Metro Configuration Set to - EIRP (ERP+2.15)

Free Space Path Loss (m and MHz) with Isotropic Antennas

ERP at Range (dBm)

EIRP at Range (dBm)

ERP at Range (dBW)

EIRP at Range (dBW)

	L1	L2	L5	
	-140	-140	-140	dBm/24 MHz
	1575.42	1227.6	1176.45	MHz
	18	18	18	feet
	5.49	5.49	5.49	meters
	-72.60	-74.77	-75.14	dBm
	54.94	33.36	30.64	pW
	35.49	35.49		
	-73.00	-78.00		dBm
	50	16		pW
	-70.85	-75.85		dBm
	67.40	65.23		dB
	-142.55	-145.38		dBm
	-140.40	-143.23		dBm
	-172.55	-175.38		dBW
	-170.40	-173.23		dBW