

Calculation of the maximum equivalent isotropically radiated power:

A = Receive antenna gain (max) = 40 dB

B = Cable insertion loss = -6 dB

C = Repeater amp gain (max) = 26 dB

D = Repeater antenna gain (max) = 3 dBi

E = Repeater antenna gain attenuator = -20 dB

Therefore:

Total system gain = A + B + C + D + E = 40 - 6 + 26 + 3 - 20 = 43 dB

Average receive power L1 North America = -130 dBm

Therefore:

Radiated Power (dBm) = -130 + 43 = -87 dBm

F = GPS frequency = 1575.42 Mhz

R = Range = 100' = 30.5 Meters

Therefore:

Free space loss with isotropic antenna =  $20\log(R) + 20\log(F) - 27.55$

$20\log(30.5) + 20\log(1575.42) - 27.55 = 66.08$  dB

Therefore:

Maximum equivalent isotropic radiated power 100' away =  $-87 - 66.08 = -153.08$  dBm

Convert dBm to dBW for output power

Effective radiated power =  $-87 - 30 = -117$  dBW

Convert to Watts

Effective radiated power =  $10^{(-117/10)} = 2$  pW

Transmitted power =  $10^{((-117-3)/10)} = 1$  pW

For the newer L1/L2 repeater:

L1

Calculation of the maximum equivalent isotropically radiated power:

A = Receive antenna gain (max) = 40 dB

B = Cable insertion loss = -6 dB

C = Repeater amp gain (max) = 30 dB

D = Repeater antenna gain (max) = 3 dBi

E = Repeater antenna gain attenuator = -20 dB

Therefore:

Total system gain = A + B + C + D + E = 40 - 6 + 30 + 3 - 20 = 47 dB

Average receive power L1 North America = -130 dBm

Therefore:

Radiated Power (dBm) = -130 + 47 = -83 dBm

F = GPS frequency = 1575.42 Mhz

R = Range = 100' = 30.5 Meters

Therefore:

Free space loss with isotropic antenna =  $20\log(R) + 20\log(F) - 27.55$

$20\log(30.5) + 20\log(1575.42) - 27.55 = 66.08$  dB

Therefore:

Maximum equivalent isotropic radiated power 100' away =  $-83 - 66.08 = -149.08$  dBm

Convert dBm to dBW for output power

Effective radiated power =  $-83 - 30 = -113$  dBW

Convert to Watts

Effective radiated power =  $10^{(-113/10)} = 5.01$  pW

Transmitted power =  $10^{((-113 - 3)/10)} = 2.51$  pW

L2

Calculation of the maximum equivalent isotropically radiated power:

A = Receive antenna gain (max) = 40 dB

B = Cable insertion loss = -6 dB

C = Repeater amp gain (max) = 30 dB

D = Repeater antenna gain (max) = 3 dBi

E = Repeater antenna gain attenuator = -20 dB

Therefore:

Total system gain = A + B + C + D + E = 40 - 6 + 30 + 3 - 20 = 47 dB

Average receive power L2 North America = -130 dBm

Therefore:

Radiated Power (dBm) = -130 + 47 = -83 dBm

F = GPS frequency = 1227 Mhz

R = Range = 100' = 30.5 Meters

Therefore:

Free space loss with isotropic antenna =  $20\log(R) + 20\log(F) - 27.55$

$20\log(30.5) + 20\log(1227) - 27.55 = 63.9$  dB

Therefore:

Maximum equivalent isotropic radiated power 100' away =  $-83 - 63.9 = -146.9$  dBm

Convert dBm to dBW for output power

Effective radiated power =  $-83 - 30 = -113$  dBW

Convert to Watts

Effective radiated power =  $10^{(-113/10)} = 5.01$  pW

Transmitted power =  $10^{((-113-3)/10)} = 2.51$  pW