

Pendergrass Pattern Test Facility

The Viasat Pendergrass pattern test range has a fixed transmit site at one end of the range transmitting from atop a 13 m structure in a North Easterly direction to the antenna under test also atop a 13 m structure. Due to the orientation of the transmit antenna the GSO arc is in the backlobe of the antenna.



PFD Calculation to the GSO arc

The transmit ERP at 48 GHz is 5 W for a 1 Hz carrier and the transmit antenna is a 30 cm parabolic antenna.

$$\text{ERP} = 6.99 \text{ dBW}$$

$$\text{EIRP} = 9.14 \text{ dBW}$$

$$\text{Off-axis angle reduction toward GSO at } 83^\circ\text{W} = -66.37 \text{ dB}$$

$$\text{Off-axis EIRP} = -57.23 \text{ dBW}$$

$$\text{Off-axis EIRP density} = -57.23 \text{ dBW/Hz}$$

$$\text{Slant Range} = 37061 \text{ km}$$

$$\text{PFD} = -57.23 \text{ dBW/Hz} - 162.37 \text{ dB(m}^2\text{)} = -219.6 \text{ dBW/(m}^2 \cdot \text{Hz)}$$

PFD Calculation to the ground

The transmit ERP at 48 GHz is 5 W for a 1 Hz carrier and the transmit antenna is a 30 cm parabolic antenna.

Calculation at base of antenna structure:

ERP = 6.99 dBW

EIRP = 9.14 dBW

Off-axis angle reduction toward ground = -70 dB

Off-axis EIRP = -60.86 dBW

Off-axis EIRP density = -60.86 dBW/Hz

Distance to ground = 13 m

PFD = -60.86 dBW/Hz – 33.27 dB(m²) = -94.13 dBW/(m² * Hz)

Calculation at horizon:

ERP = 6.99 dBW

EIRP = 9.14 dBW

Off-axis angle reduction toward ground = 0 dB

Off-axis EIRP = 9.14 dBW

Off-axis EIRP density = 9.14 dBW/Hz

Distance to horizon = 12.88 km

PFD = 9.14 dBW/Hz – 93.19 dB(m²) = -84.01 dBW/(m² * Hz)