

Name: APERR_007V01**Description:****Type:** Earth station, Receiving

Appendix 30 reference receiving earth station antenna pattern for Regions 1 and 3 (WRC-97). Frequency is fixed to 12.1 GHz.

Region(s): 13**Required Input Parameters:**

gain,ant_diam

Validation Warnings/Errors:

| Type | Message |
|---------|--|
| Error | Gmax () is less than G1 (). Square root of negative value. |
| Error | Phir () is less than Phim (). |
| Error | Phi2 () is less than Phi1 (). |
| Error | 0 () is less than S (). |
| Warning | Phir () is less than Phim (). |

Pattern Information:

Used at WRC-97 for revising the Regions 1 and 3 BSS Plan.

The Plan was based on a 60 cm antenna given in Recommendation ITU-R BO.1213. Antenna maximum gain was 35.5 dBi and the reference frequency was 12.1 GHz. The minimum antenna diameter was such that the half-power beamwidth was 2.86 degrees.

The pattern requires input parameter antenna diameter.

Co-Polar Component:

$$\begin{aligned}
 G &= G_{\max} - 2.5 \times 10^{-3} (D/\lambda \varphi)^2 & \text{for } 0^\circ \leq \varphi < \varphi_m \\
 G &= G_1 & \text{for } \varphi_m \leq \varphi < \varphi_r \\
 G &= 29 - 25 \log \varphi & \text{for } \varphi_r \leq \varphi < \varphi_b \\
 G &= -5 & \text{for } \varphi_b \leq \varphi < 70^\circ \\
 G &= 0 & \text{for } 70^\circ \leq \varphi \leq 180^\circ
 \end{aligned}$$

where:

λ is the wavelength corresponding to fixed reference frequency of 12.1 GHz.

$$\varphi_m = 20 \lambda / D \sqrt{G_{\max} - G_1} .$$

$$\varphi_r = 95 \lambda / D .$$

$$G_1 = 29 - 25 \log \varphi_r .$$

$$\varphi_b = 10 \left(\frac{34}{25} \right) .$$

Cross-Polar Component:

$$\begin{aligned}
 G_x &= G_{\max} - 25 & \text{for } 0^\circ \leq \varphi < 0.25 \varphi_0 \\
 G_x &= G_{\max} - 25 + 8 \left(\frac{\varphi - 0.25 \varphi_0}{0.19 \varphi_0} \right) & \text{for } 0.25 \varphi_0 \leq \varphi < 0.44 \varphi_0 \\
 G_x &= G_{\max} - 17 & \text{for } 0.44 \varphi_0 \leq \varphi < \varphi_0 \\
 G_x &= G_{\max} - 17 + S \left| \frac{\varphi - \varphi_0}{\varphi_1 - \varphi_0} \right| & \text{for } \varphi_0 \leq \varphi < \varphi_1 \\
 G_x &= 21 - 25 \log \varphi & \text{for } \varphi_1 \leq \varphi < \varphi_2 \\
 G_x &= -5 & \text{for } \varphi_2 \leq \varphi < 70^\circ \\
 G_x &= 0 & \text{for } 70^\circ \leq \varphi \leq 180^\circ
 \end{aligned}$$

where:

$$S = 21 - 25 \log \varphi_1 - (G_{\max} - 17)$$

$$\varphi_0 = 2 \lambda / D \sqrt{\frac{3}{0.0025}} .$$

$$\varphi_1 = \frac{\varphi_0}{2} \sqrt{10.1875} .$$

$$\varphi_2 = 10 \left(\frac{26}{25} \right) .$$