

Name: APEREC023V01**Description:****Type:** Earth station, Transmitting

Recommendation ITU-R S.1855 alternative reference radiation pattern for TRANSMITTING GSO earth station antennas for use in coordination and/or interference assessment in the frequency range from 2 to 31 GHz.

Region(s): 123**Required Input Parameters:**

gain,dgso

Validation Warnings/Errors:

Type	Message
Error	D/lambda () is less than 15 ().
Error	D_gso () is less than D_equiv ().
Error	Freq () is out of limits [2GHz:31GHz].

Pattern Information:

Note 7 of the recommendation is not applied.

The pattern requires input parameter dgso.

BR software sets antenna efficiency to 0.7 for technical examination.

Co-Polar Component:If $\varphi_m < \varphi_r$:

$$G = G_{\max} - 2.5 \times 10^{-3} ((D/\lambda)_{\theta} \varphi)^2 \quad \text{for } 0^\circ \leq \varphi < \varphi_m$$

$$G = G_1 \quad \text{for } \varphi_m \leq \varphi \leq \varphi_r$$

$$G = \min(G_1, 29 + 3 \sin^2 \theta - 25 \log \varphi) \quad \text{for } \varphi_r < \varphi < \varphi_{\min}$$

If $\varphi_m \geq \varphi_r$:

$$G = G_{\max} - 2.5 \times 10^{-3} ((D/\lambda)_{\theta} \varphi)^2 \quad \text{for } 0^\circ \leq \varphi < \varphi_1$$

$$G = \max(G_{\max} - 2.5 \times 10^{-3} ((D/\lambda)_{\theta} \varphi)^2, 29 + 3 \sin^2 \theta - 25 \log \varphi) \quad \text{for } \varphi_1 \leq \varphi < \varphi_{\min}$$

$$G = 29 + 3 \sin^2 \theta - 25 \log \varphi \quad \text{for } \varphi_{\min} \leq \varphi \leq 7^\circ$$

$$G = 7.9 + 3(\sin^2 \theta) \left(\frac{9.2 - \varphi}{2.2} \right) \quad \text{for } 7^\circ < \varphi \leq 9.2^\circ$$

$$G = 32 - 25 \log \varphi \quad \text{for } 9.2^\circ < \varphi \leq \varphi_b$$

If $(D/\lambda)_{\text{eq}} \geq 46.8$:

$$G = -10 \quad \text{for } \varphi_b < \varphi \leq 180^\circ$$

If $15 \leq (D/\lambda)_{\text{eq}} < 46.8$:

$$G = -5 \quad \text{for } \varphi_b < \varphi \leq 70^\circ$$

$$G = 0 \quad \text{for } 70^\circ < \varphi \leq 180^\circ$$

where:

$$(D/\lambda)_{\text{eq}} = \sqrt{10 \left(\frac{G_{\max}}{10} \right)} \cdot \eta \pi^2 \quad (D/\lambda)_{\theta} = \frac{\frac{1}{\lambda} \frac{D_{\text{GSO}}}{K}}{\sqrt{\sin^2 \theta + \left(\frac{1}{K} \right)^2 \cos^2 \theta}}$$

$$K = \left(\frac{D_{\text{GSO}}}{D_{\text{eq}}} \right)^2 \cdot \varphi_r = 15.85 (D/\lambda)_{\theta}^{-0.6} \cdot \varphi_1 = 0.9 * 114 (D/\lambda)_{\theta}^{-1.09}$$

$$\varphi_{\min} = \max(\varphi_r, 118 (D/\lambda)_{\theta}^{-1.06})$$

$$G_1 = 29 - 25 \log \varphi_r + 3 \sin^2 \theta \cdot \varphi_m = 20 (\lambda/D)_{\theta} \sqrt{G_{\max} - G_1}$$

$$\varphi_b = 10 \left(\frac{42}{25} \right) \text{ for } (D/\lambda)_{\text{eq}} \geq 46.8, 10 \left(\frac{37}{25} \right) \text{ for } (D/\lambda)_{\text{eq}} < 46.8$$