Predicted Antenna Patterns for the D18_CX-001 Tx/Rx X Band Reflector Antenna

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1 Introduction

This report contains the predicted antenna patterns for the new Optim Microwave center-fed 18" reflector antenna for Tx/Rx applications at X Band. The receive band is 7.25-7.75 GHz. The transmit band is 7.90-8.40 GHz. The feed port is a 1.070" diameter circular waveguide.

2 Predicted Antenna Performance

2.1 Predicted Reflections, Gains, Beamwidths and First Sidelobe Levels

Table 1 contains the predicted reflection coefficients, gains, beamwidths and first sidelobe levels for the antenna. An exaggerated loss of 0.1 dB has been assumed in the gain calculations.

Frequency (GHz)	Predicted Reflection Coefficient	Estimated Gain (dBi)	E Plane 3 dB Beamwidth (degrees)	E Plane 1st Sidelobe (dBp)	H Plane 3 dB Beamwidth (degrees)	H Plane 1st Sidelobe (dBp)
7.240	0.026	29.18	5.54	-17.63	5.58	-13.01
7.370	0.019	29.46	5.47	-17.18	5.56	-13.31
7.500	0.019	29.71	5.39	-16.52	5.56	-13.76
7.630	0.023	29.91	5.35	-16.13	5.54	-14.21
7.760	0.030	30.07	5.37	-16.03	5.47	-14.45
7.890	0.030	30.22	5.39	-15.99	5.37	-14.58
8.020	0.030	30.33	5.43	-16.16	5.30	-14.90
8.150	0.028	30.38	5.46	-15.48	5.22	-15.77
8.280	0.030	30.41	5.45	-14.99	5.14	-16.20
8.410	0.032	30.49	5.36	-14.69	5.09	-16.41

Table 1: Predicted Performance Parameters

2.2 Predicted E and H Plane Patterns

Example predicted patterns are shown in Figures 1 to 20. On each plot is shown a reference curve corresponding to:

$$\text{Gain} = \max(-10, 32 - 25\log_{10}(\theta)) \text{ dBi} \qquad (\theta \text{ in degrees}) \quad (1)$$

In plotting this curve, it is assumed that there are no losses in the antenna. If radome and waveguide losses are included, the antenna patterns will move down relative to this reference curve.

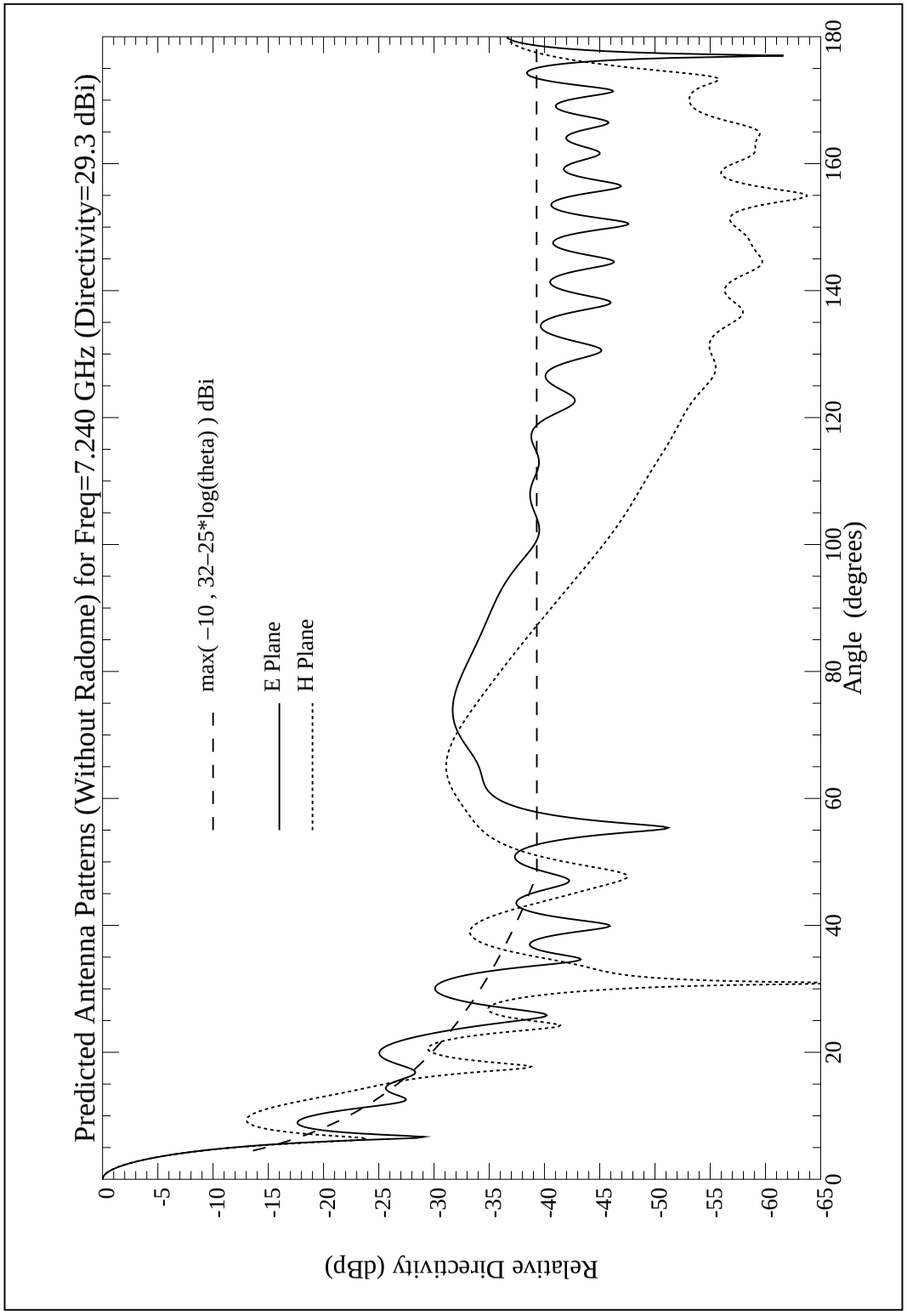

Figure 1: Antenna Patterns for 7.240 GHz

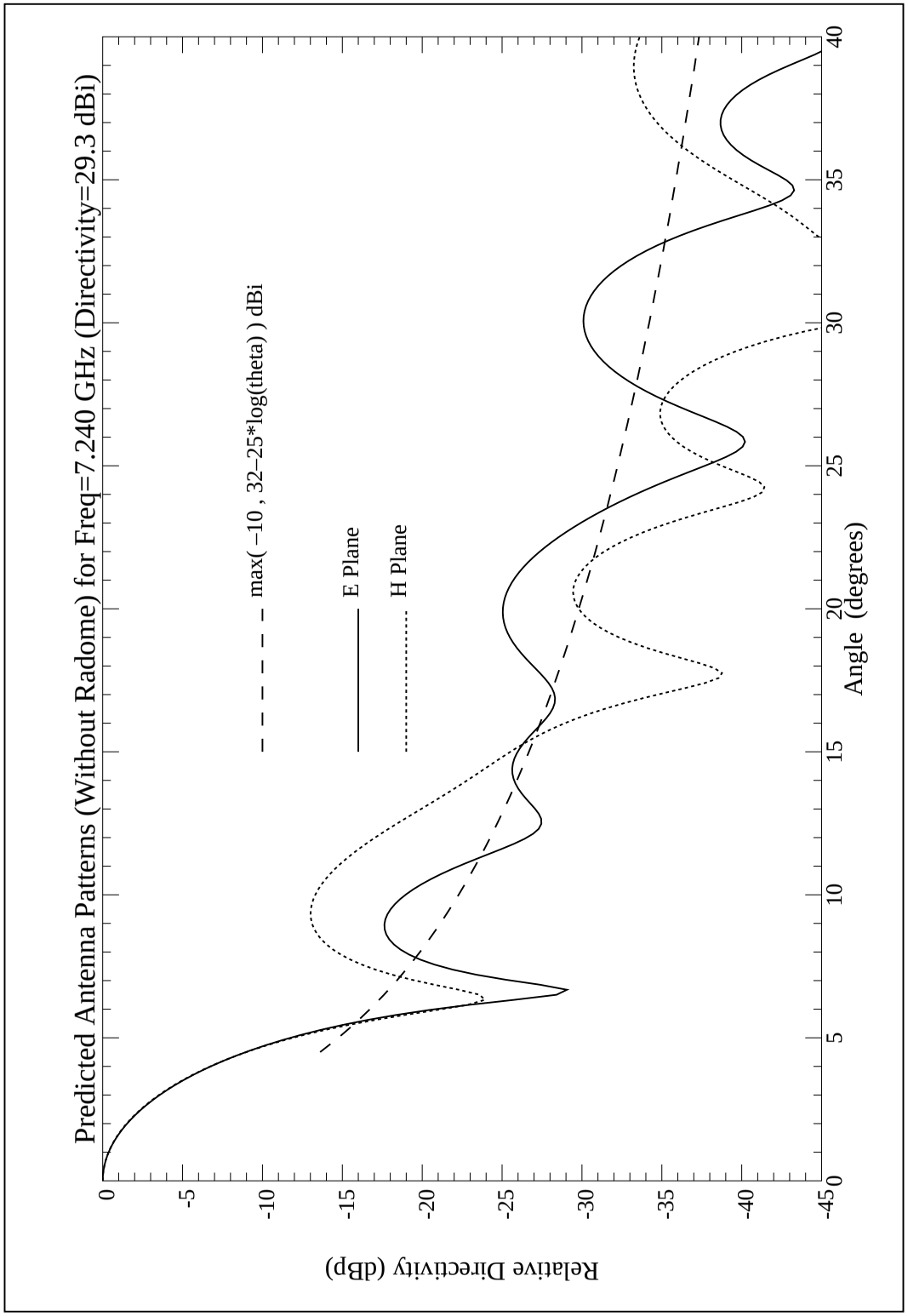

Figure 2: Antenna Patterns for 7.240 GHz

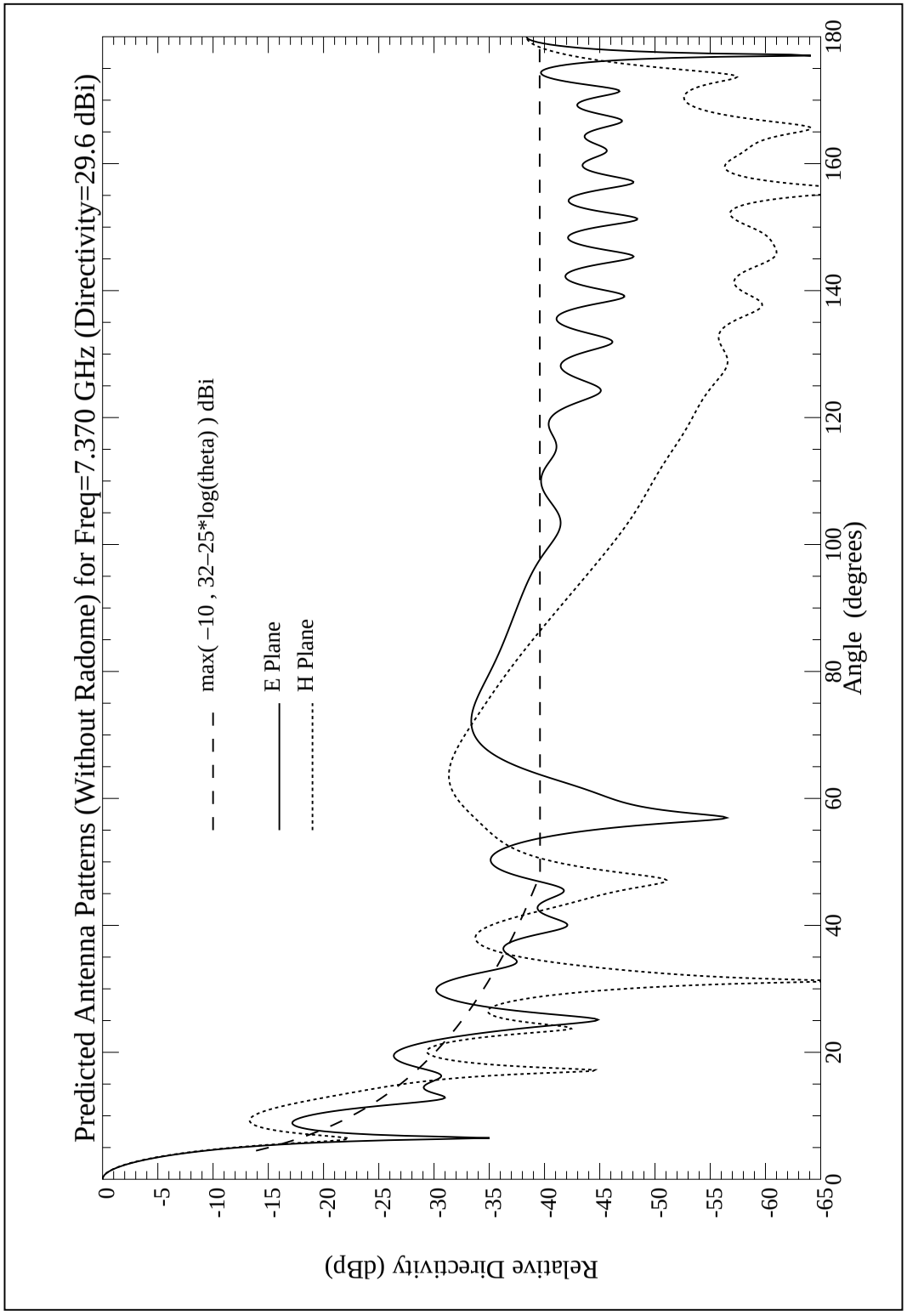

Figure 3: Antenna Patterns for 7.370 GHz

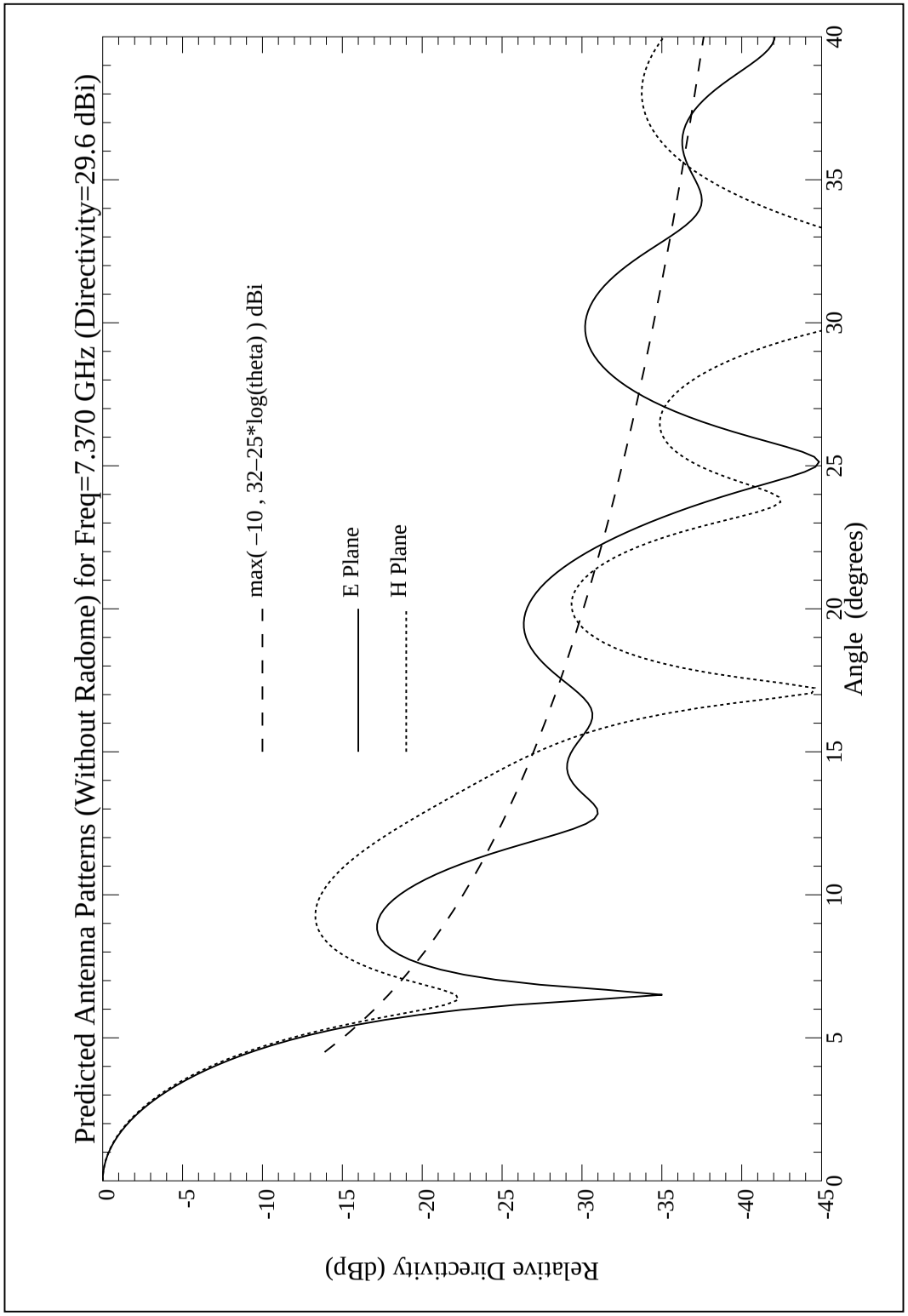

Figure 4: Antenna Patterns for 7.370 GHz

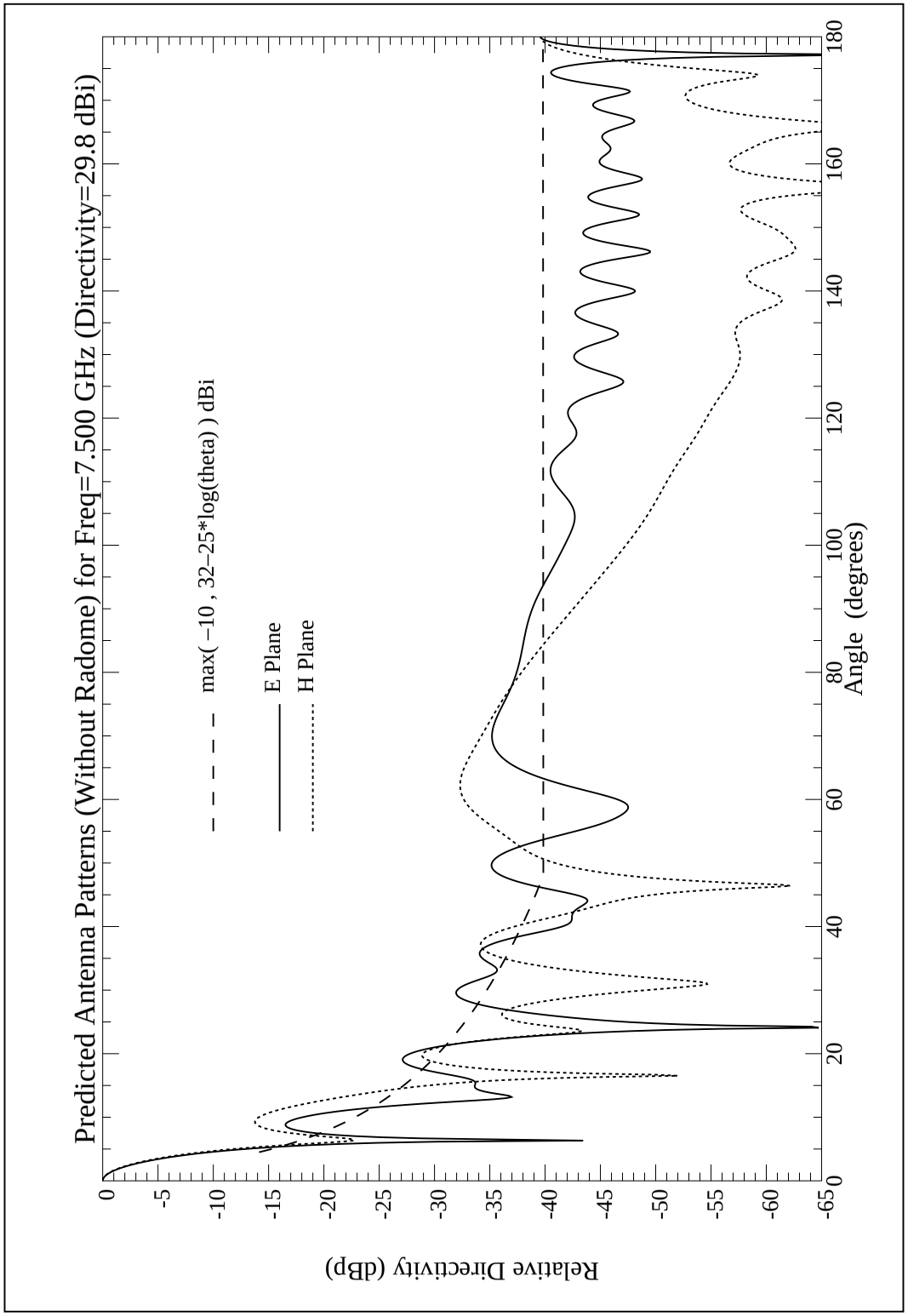

Figure 5: Antenna Patterns for 7.500 GHz

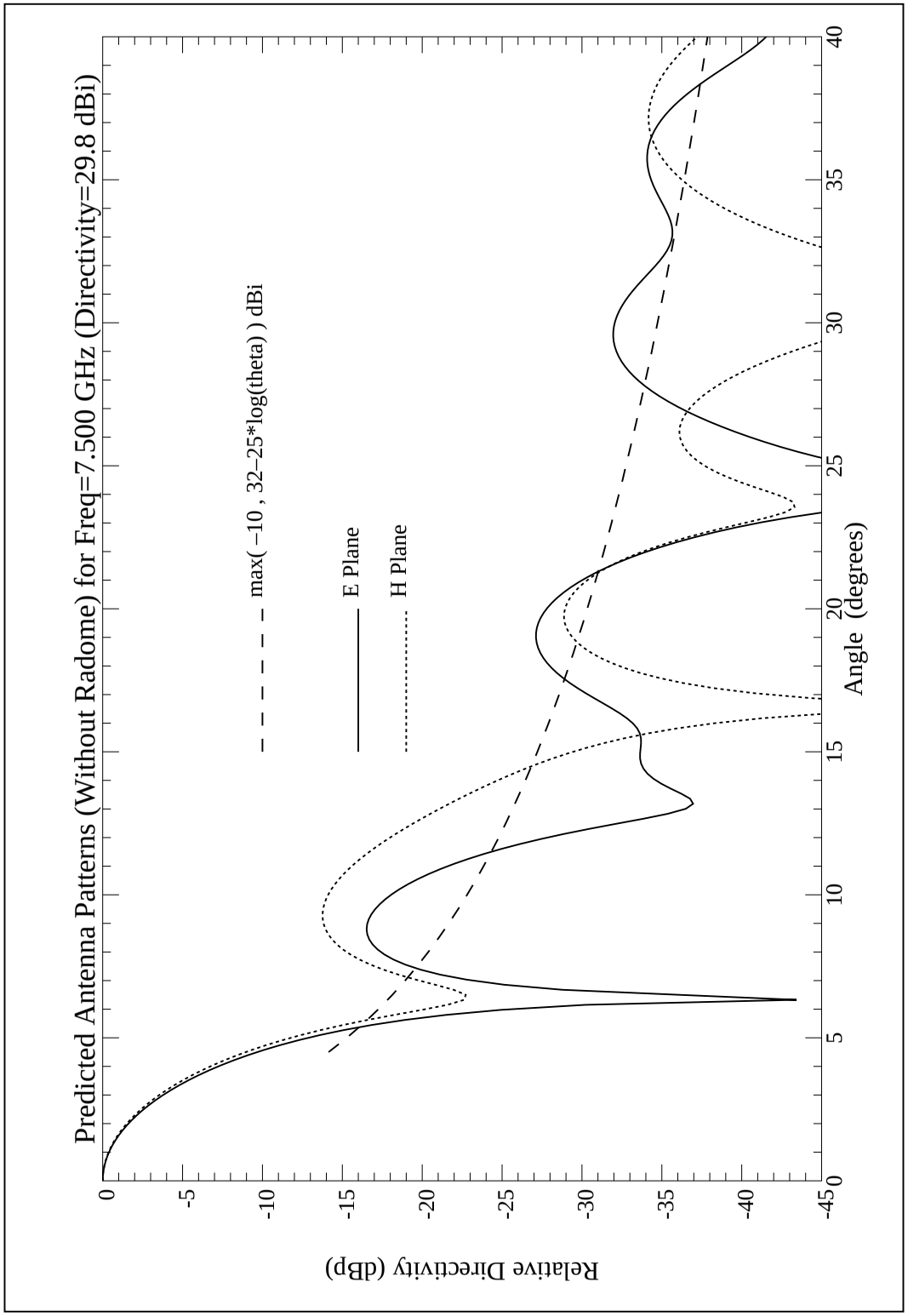

Figure 6: Antenna Patterns for 7.500 GHz

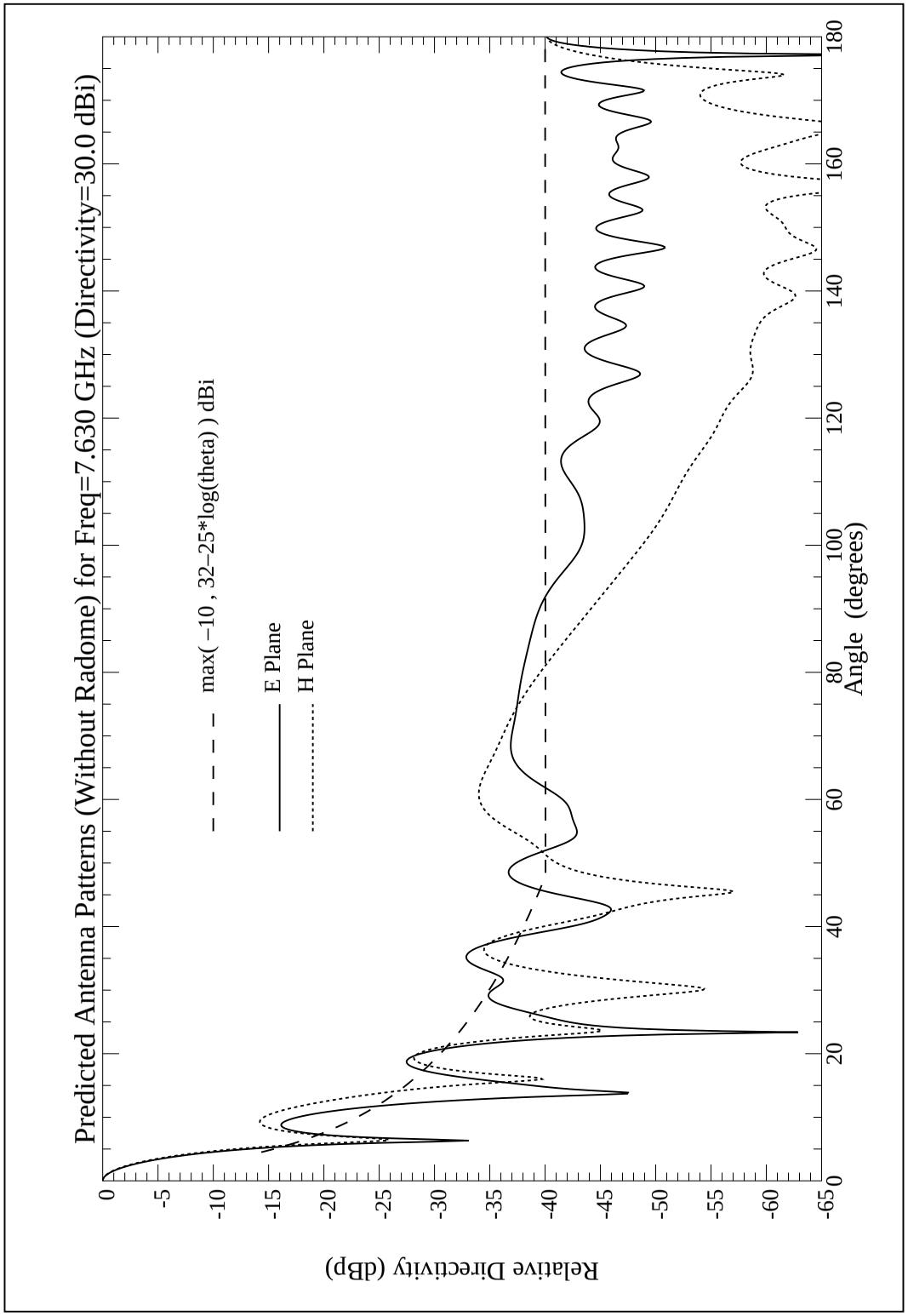

Figure 7: Antenna Patterns for 7.630 GHz

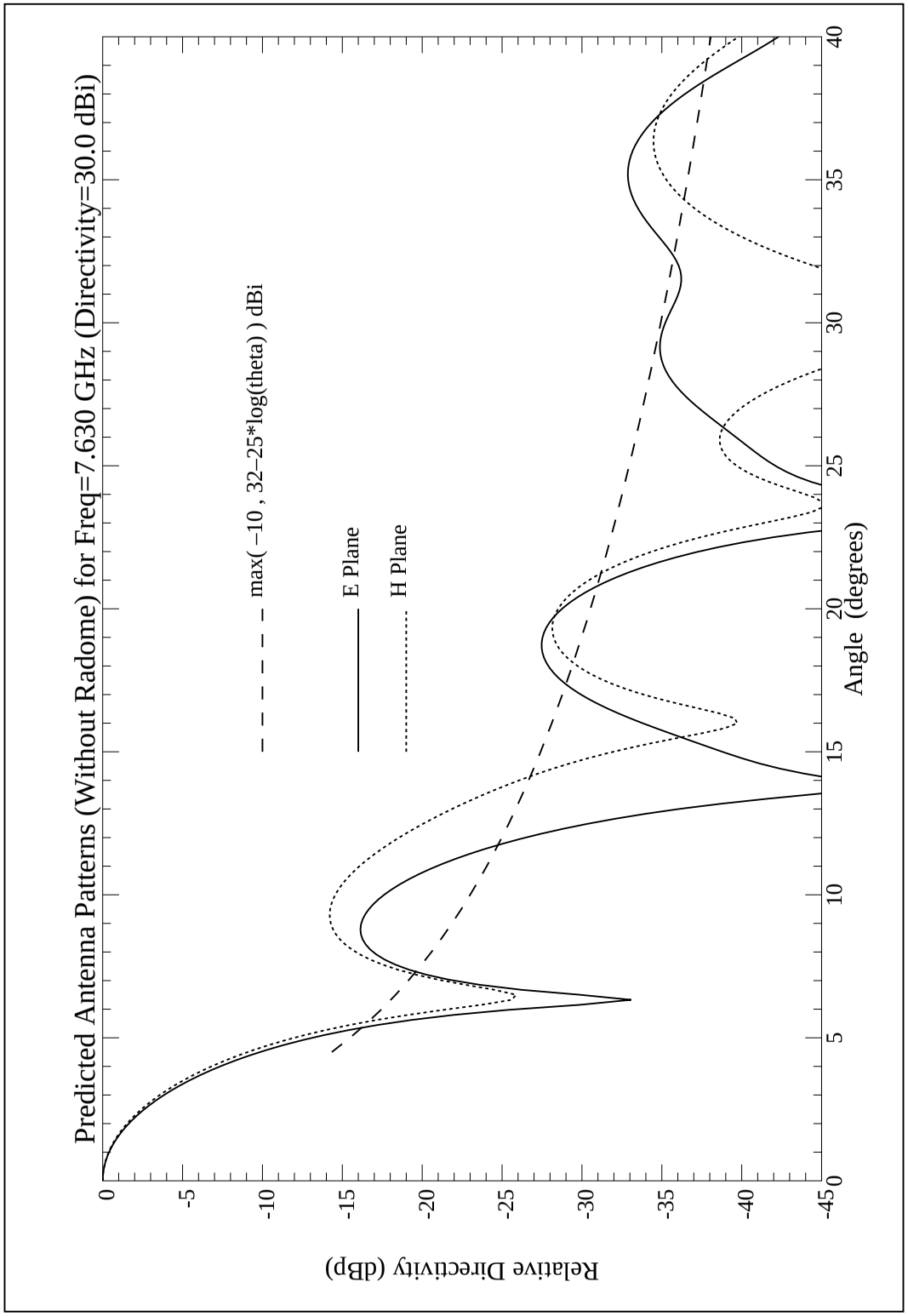

Figure 8: Antenna Patterns for 7.630 GHz

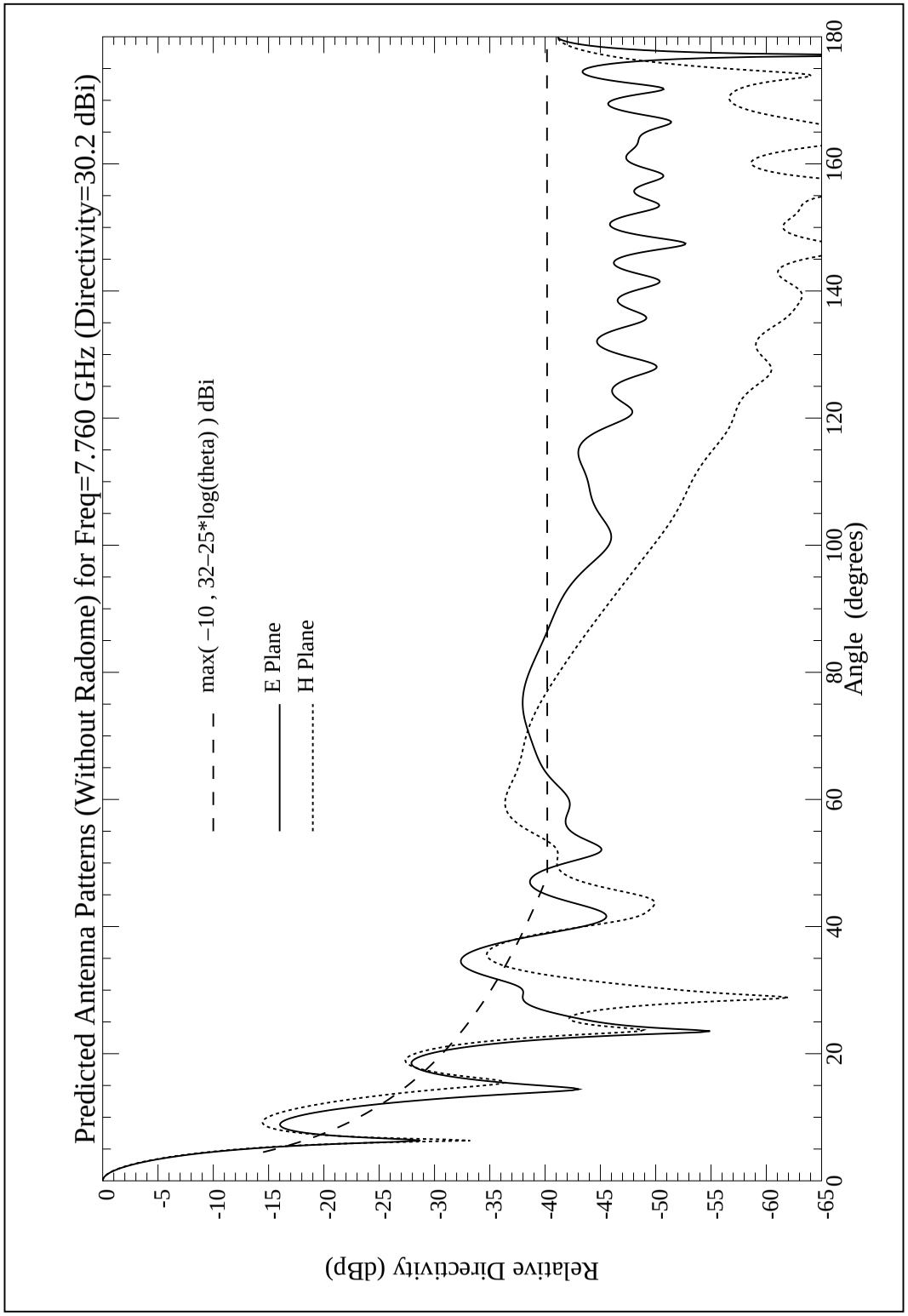

Figure 9: Antenna Patterns for 7.760 GHz

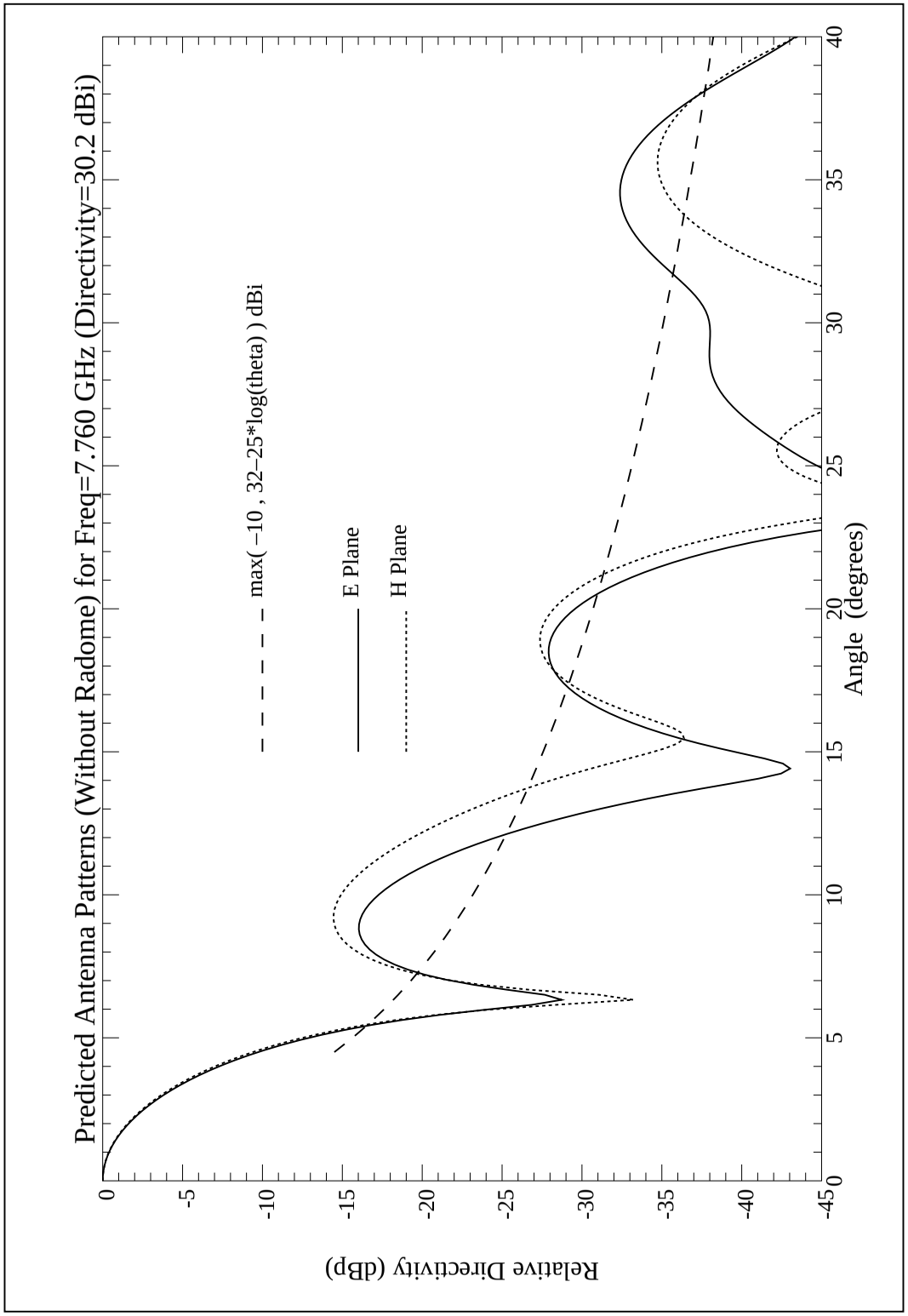

Figure 10: Antenna Patterns for 7.760 GHz

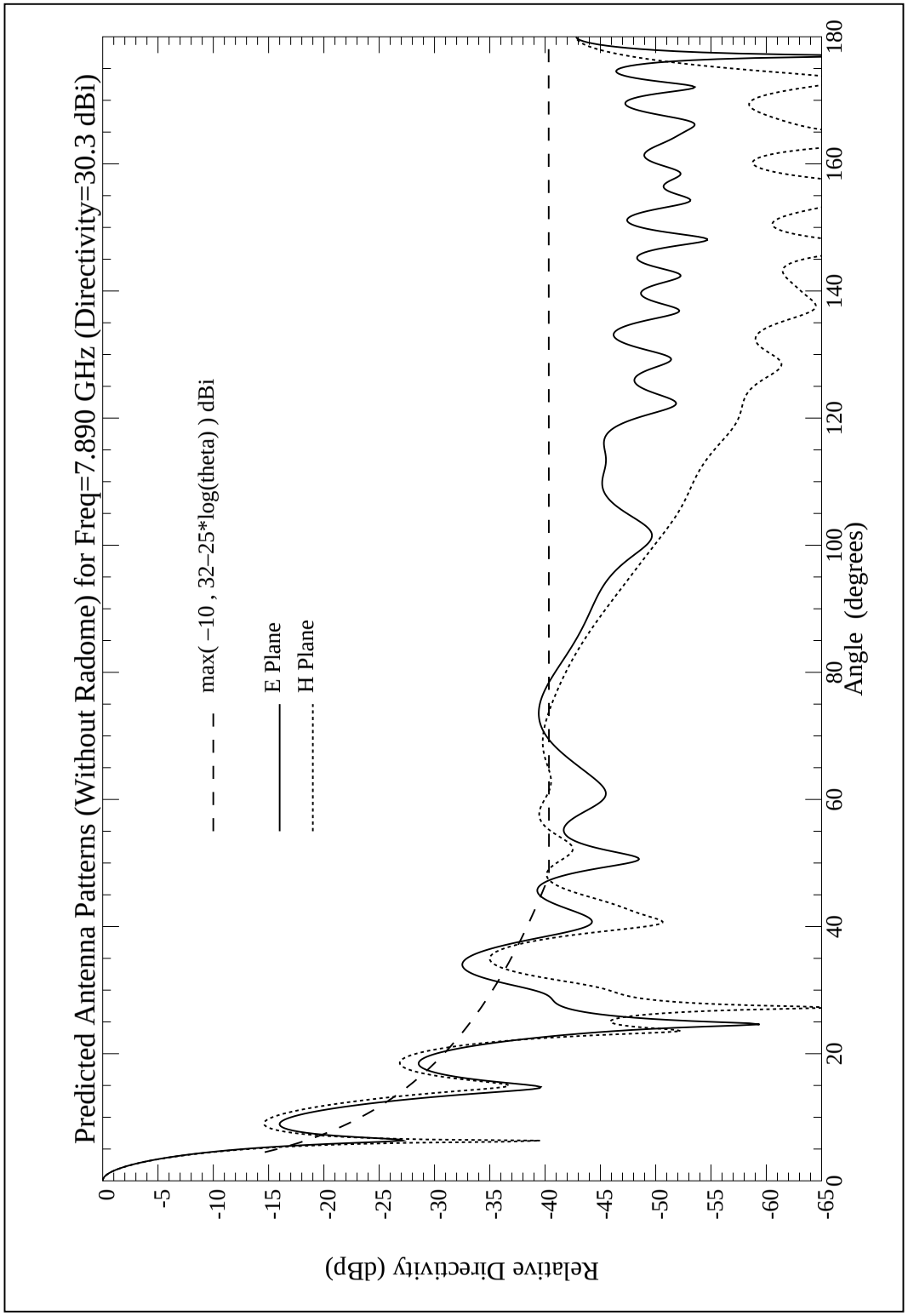

Figure 11: Antenna Patterns for 7.890 GHz

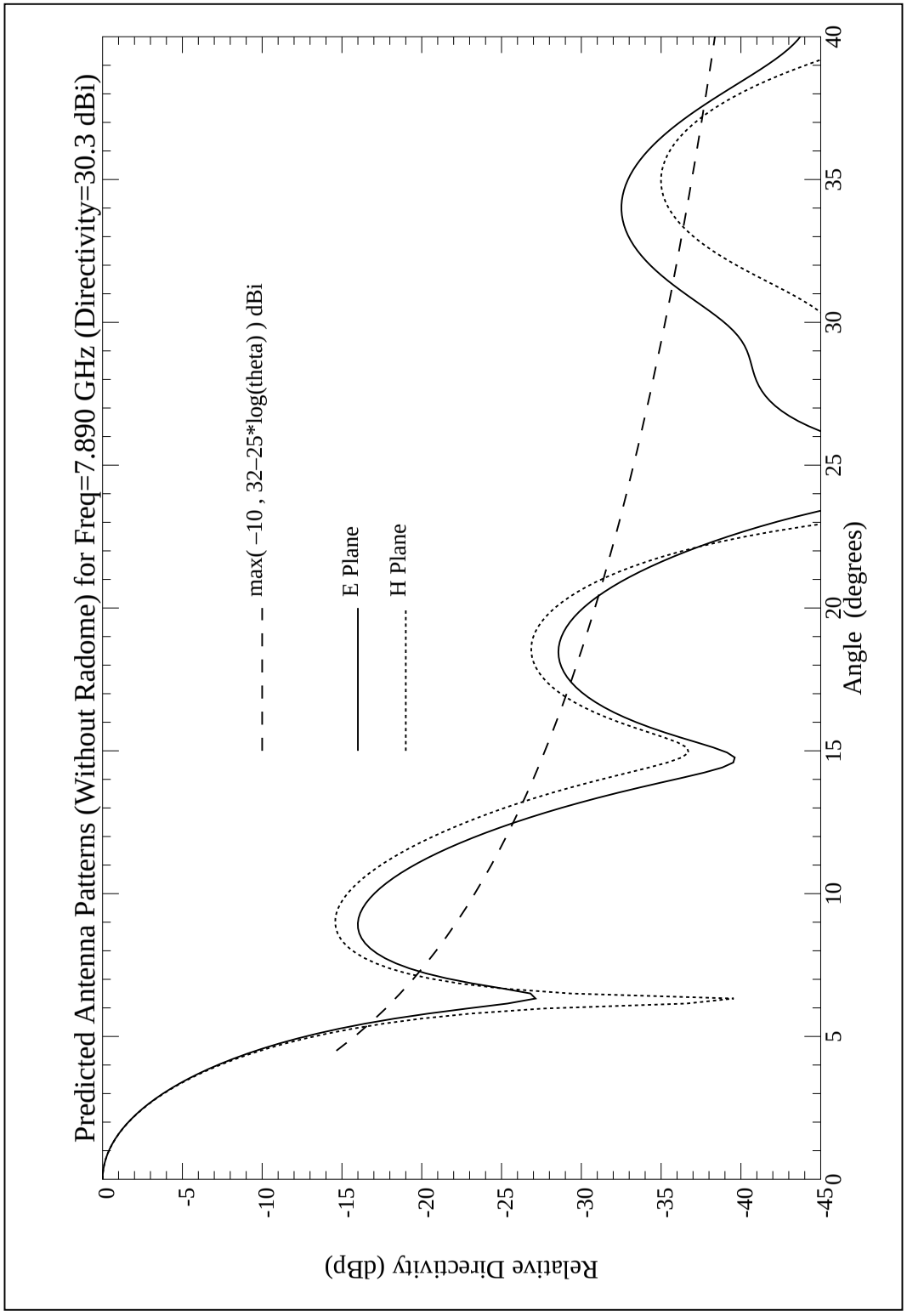

Figure 12: Antenna Patterns for 7.890 GHz

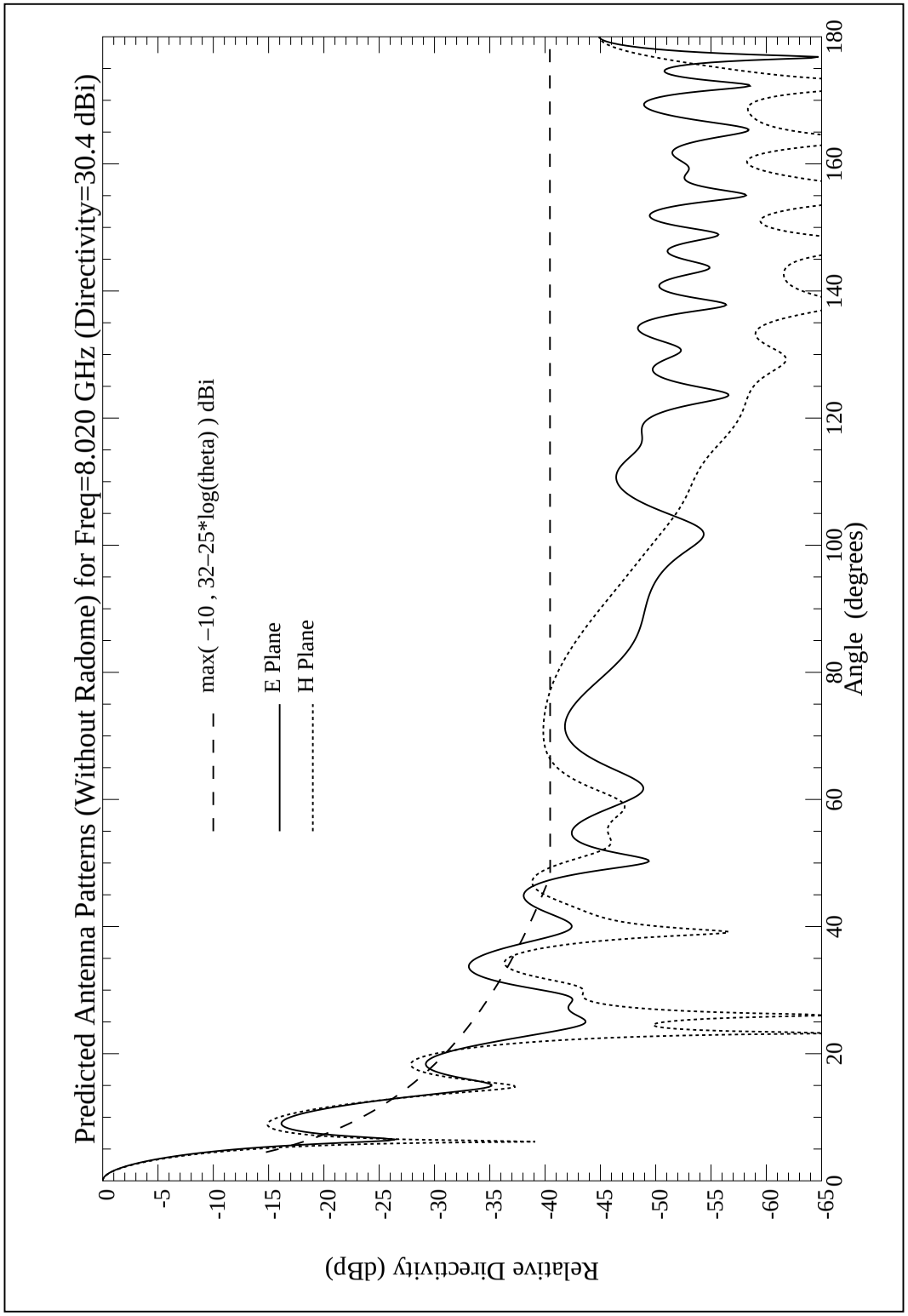

Figure 13: Antenna Patterns for 8.020 GHz

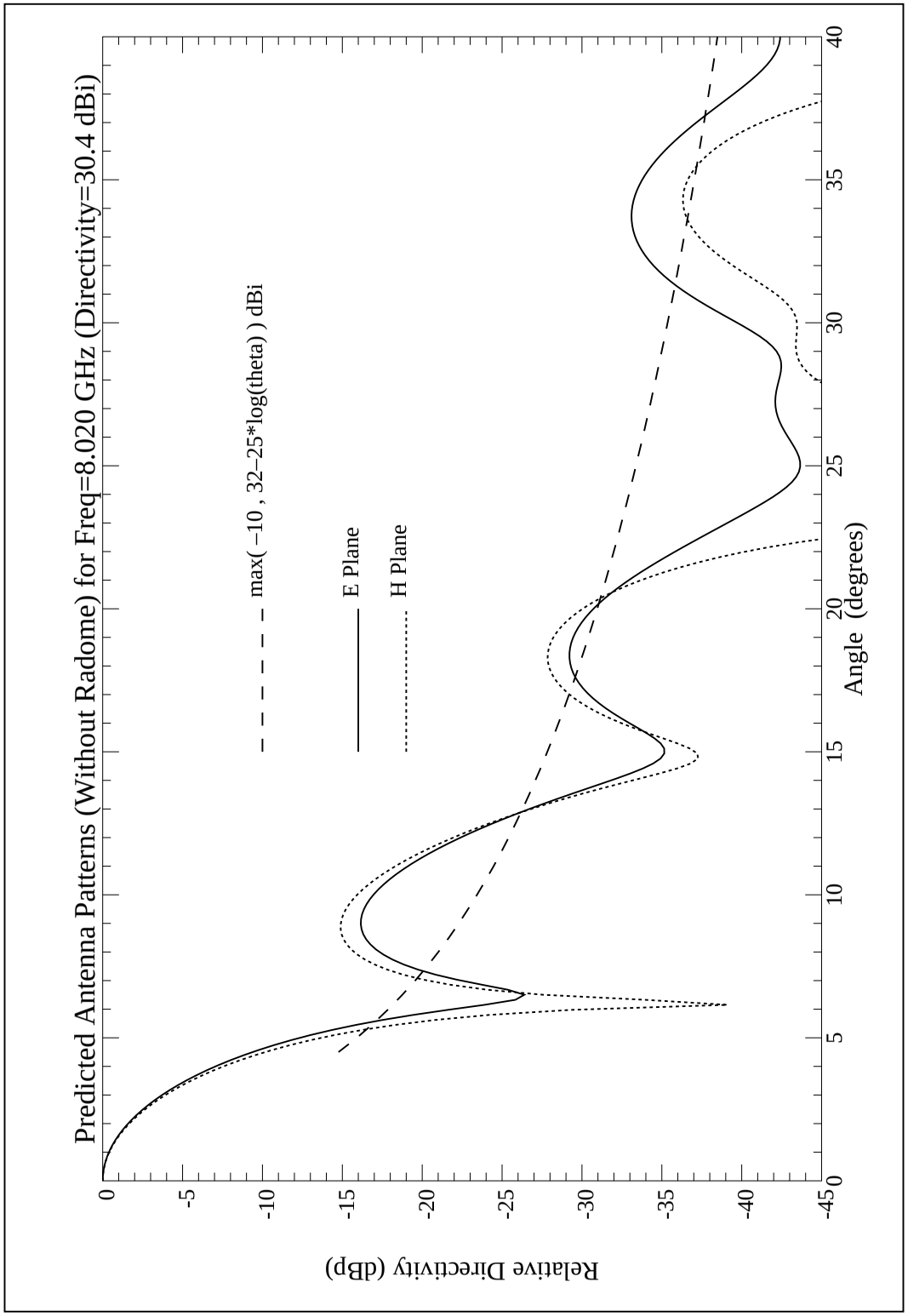

Figure 14: Antenna Patterns for 8.020 GHz

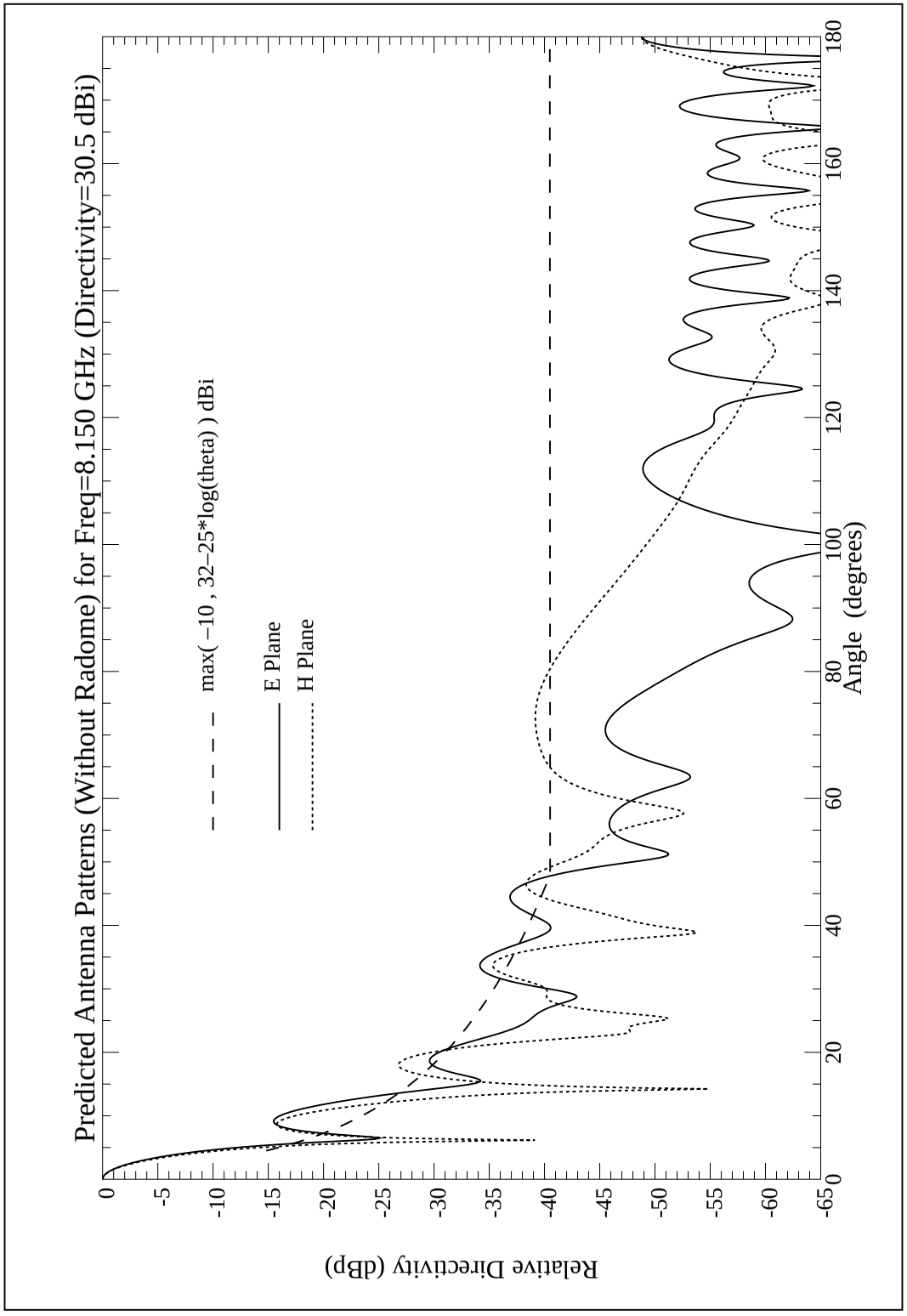

Figure 15: Antenna Patterns for 8.150 GHz

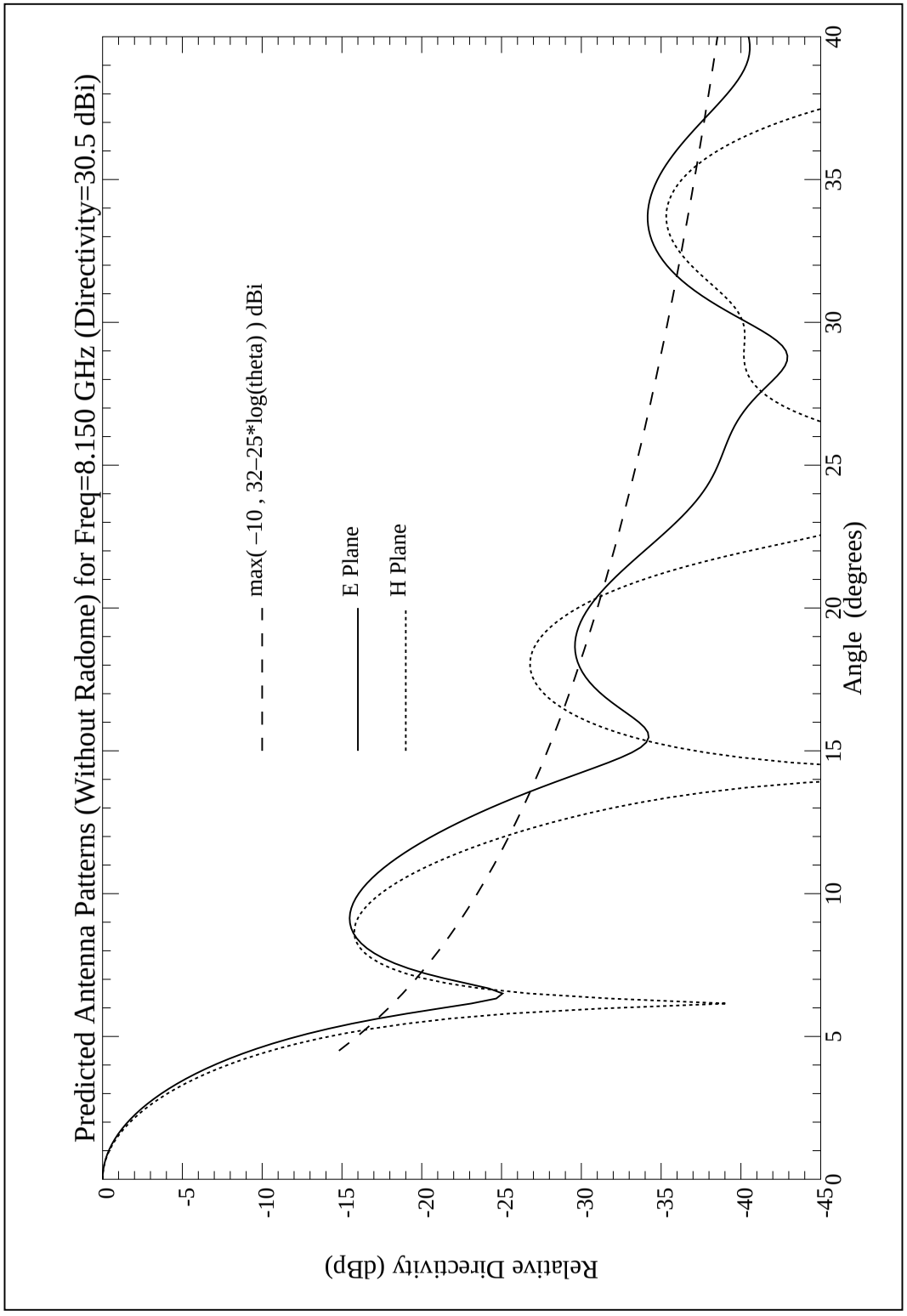

Figure 16: Antenna Patterns for 8.150 GHz

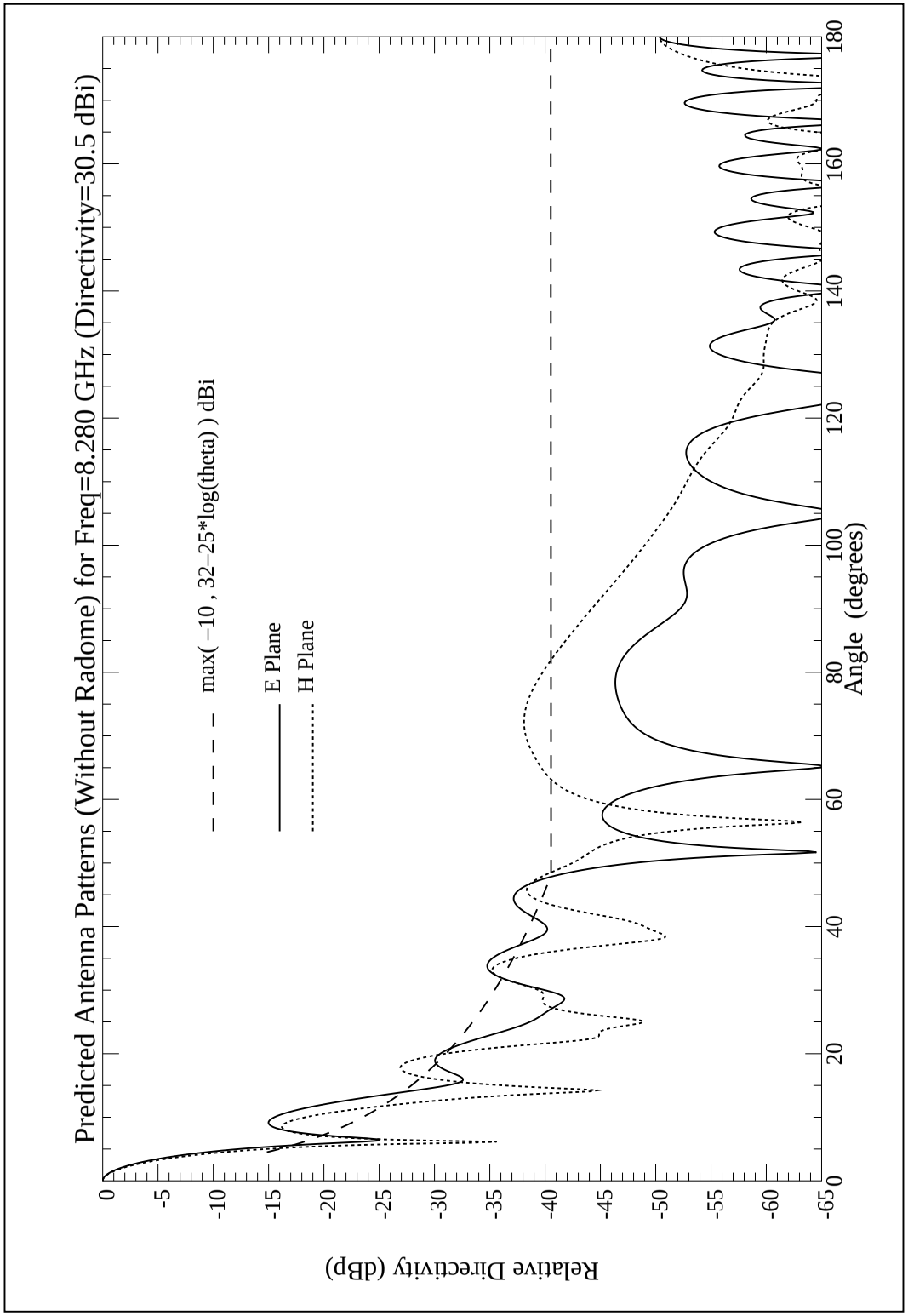

Figure 17: Antenna Patterns for 8.280 GHz

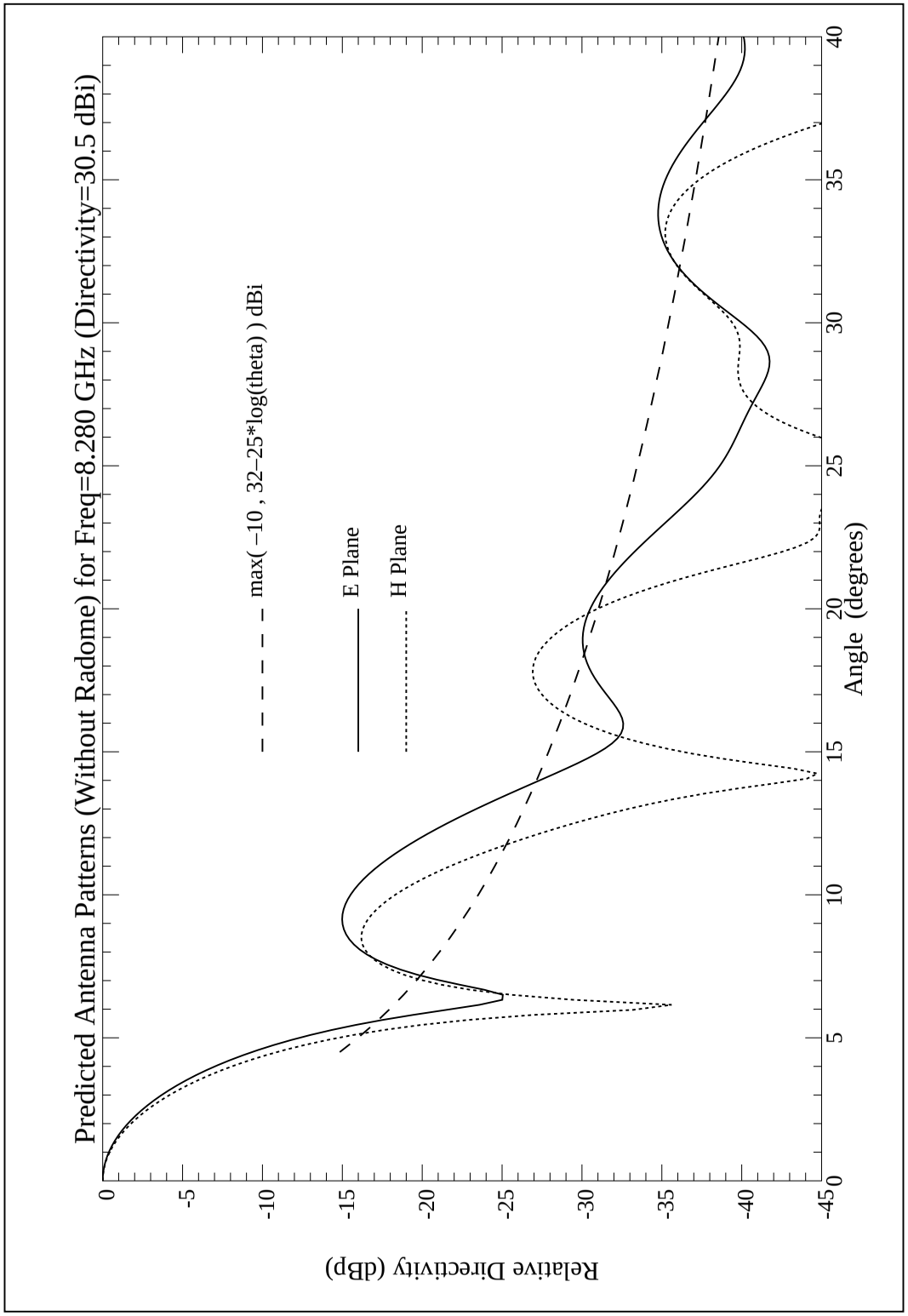

Figure 18: Antenna Patterns for 8.280 GHz

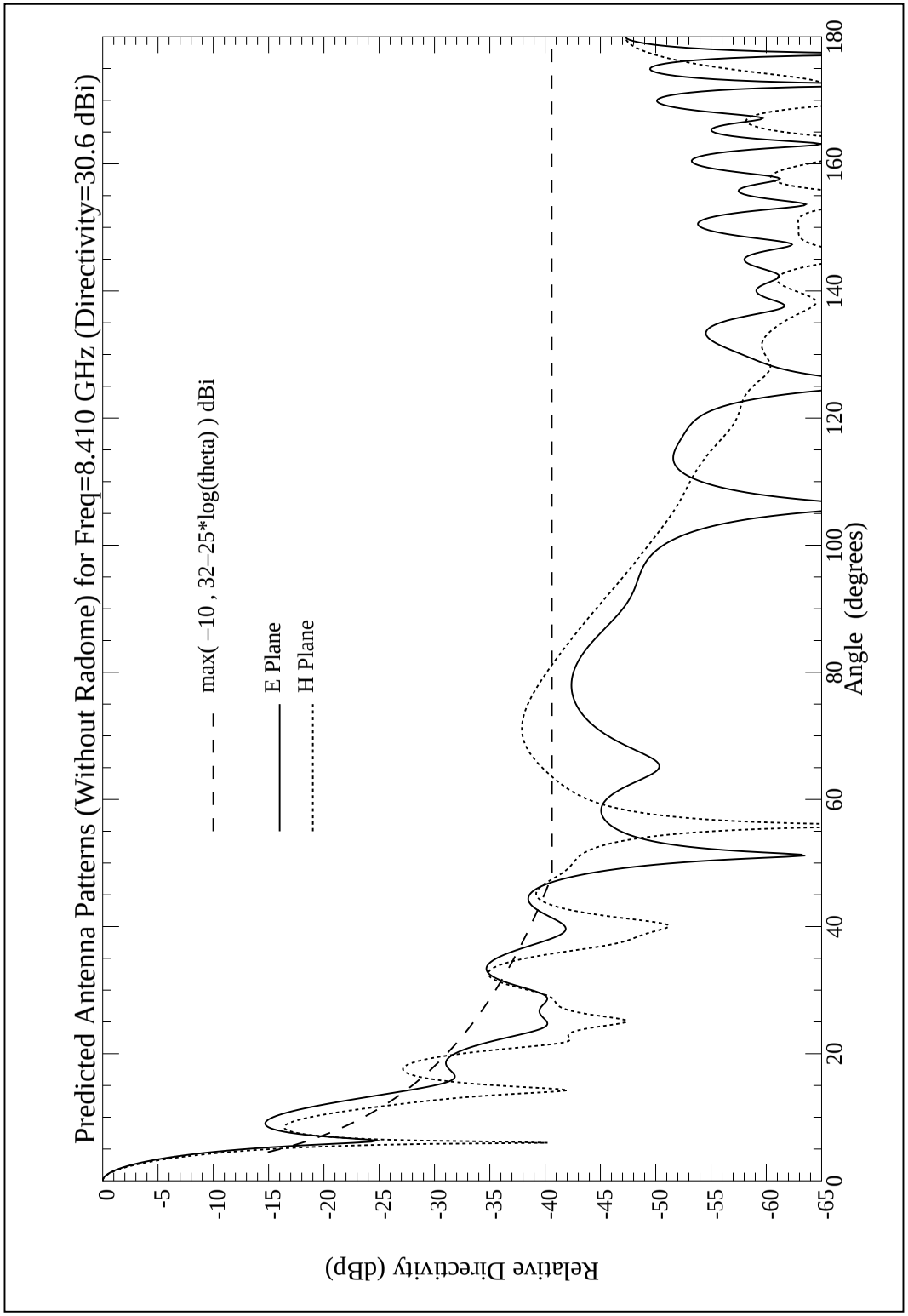

Figure 19: Antenna Patterns for 8.410 GHz

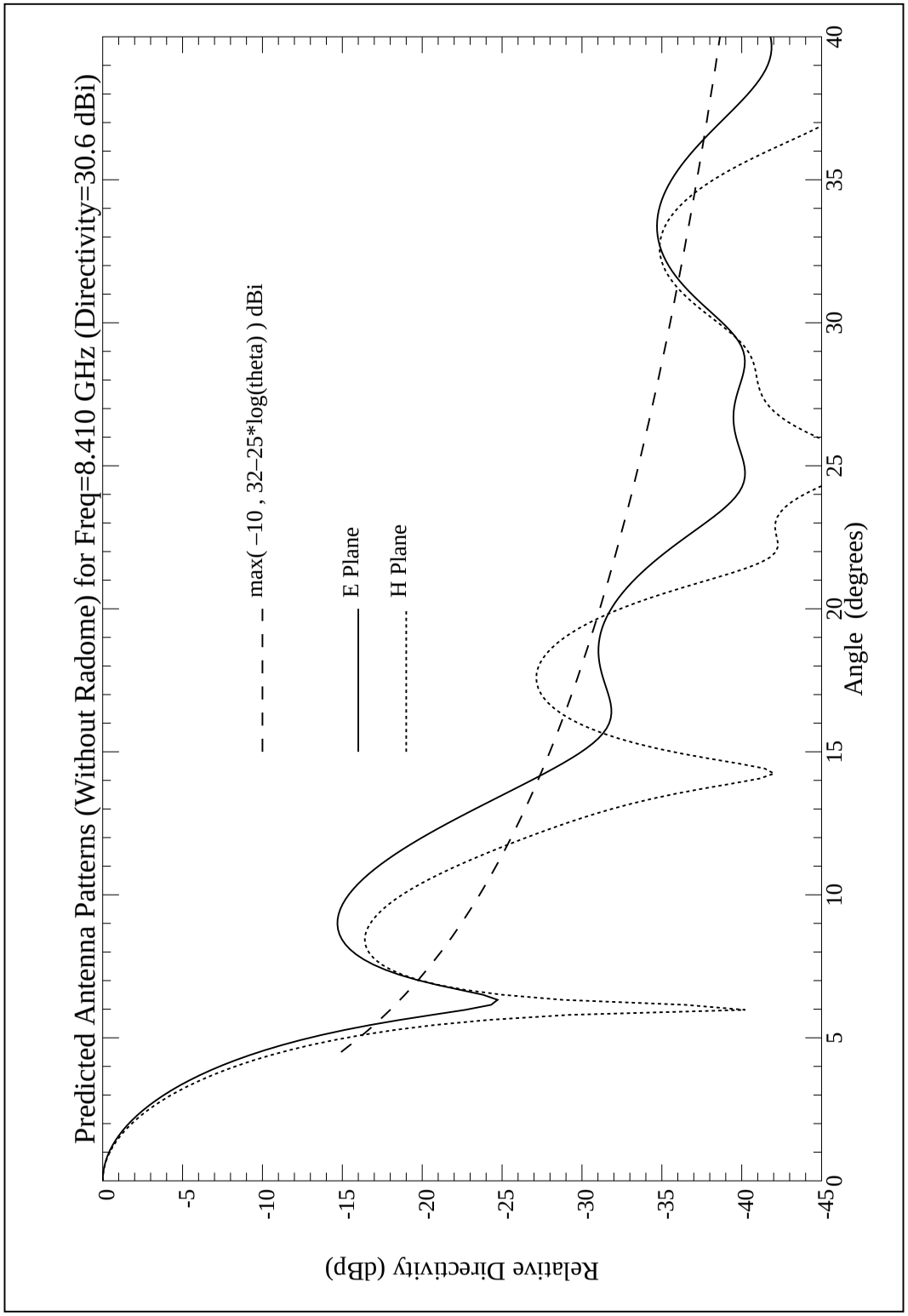

Figure 20: Antenna Patterns for 8.410 GHz

2.3 Predicted CP Patterns and Linear Patterns on the 45° Plane

Example predicted patterns are shown in Figures 21 to 40. On each plot is shown a reference curve corresponding to:

$$\text{Gain} = \max(-10, 32 - 25\log_{10}(\theta)) \text{ dBi} \qquad (\theta \text{ in degrees}) \quad (2)$$

In plotting this curve, it is assumed that there are no losses in the antenna. If radome and waveguide losses are included, the antenna patterns will move down relative to this reference curve.

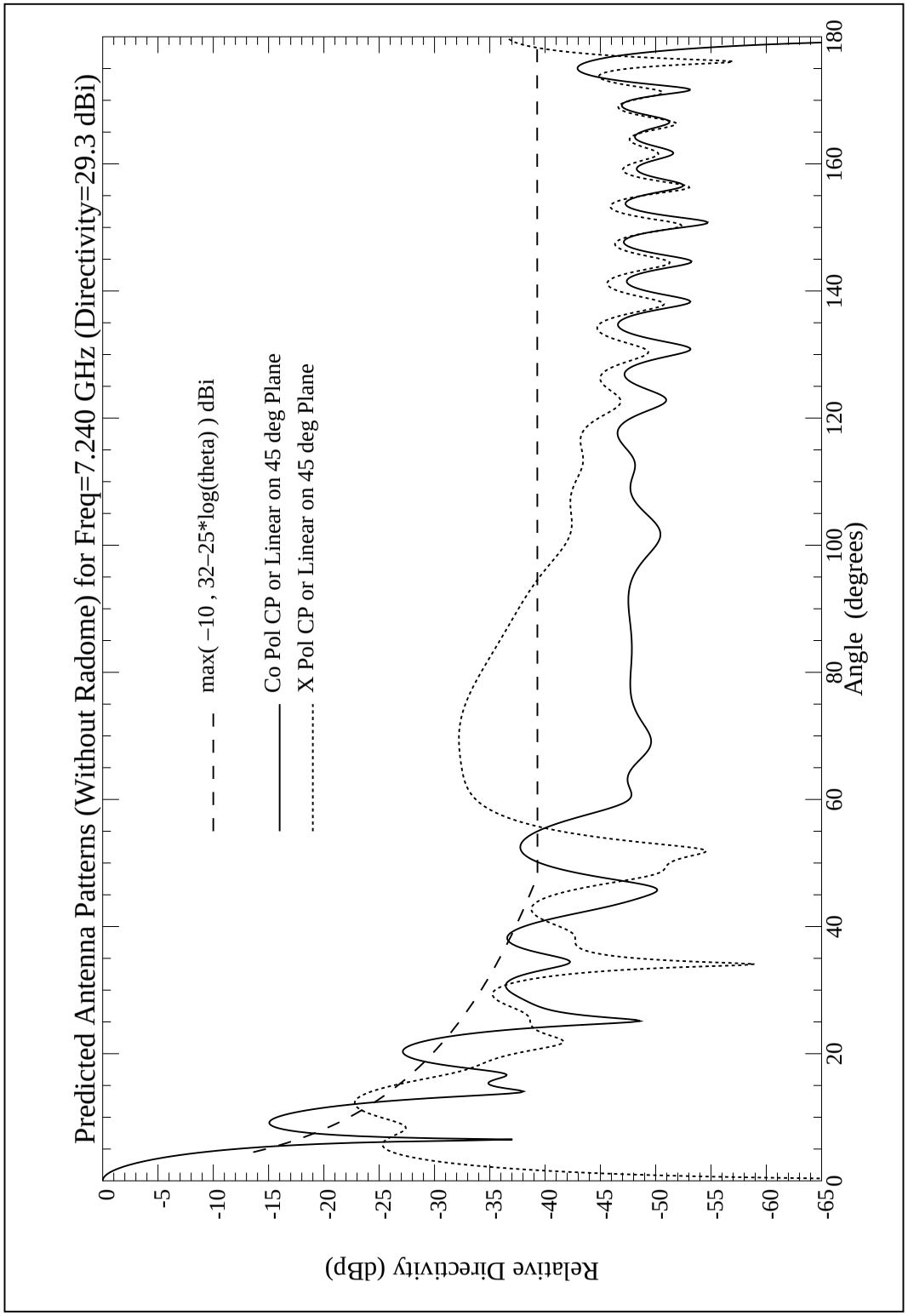

Figure 21: Antenna Patterns for 7.240 GHz

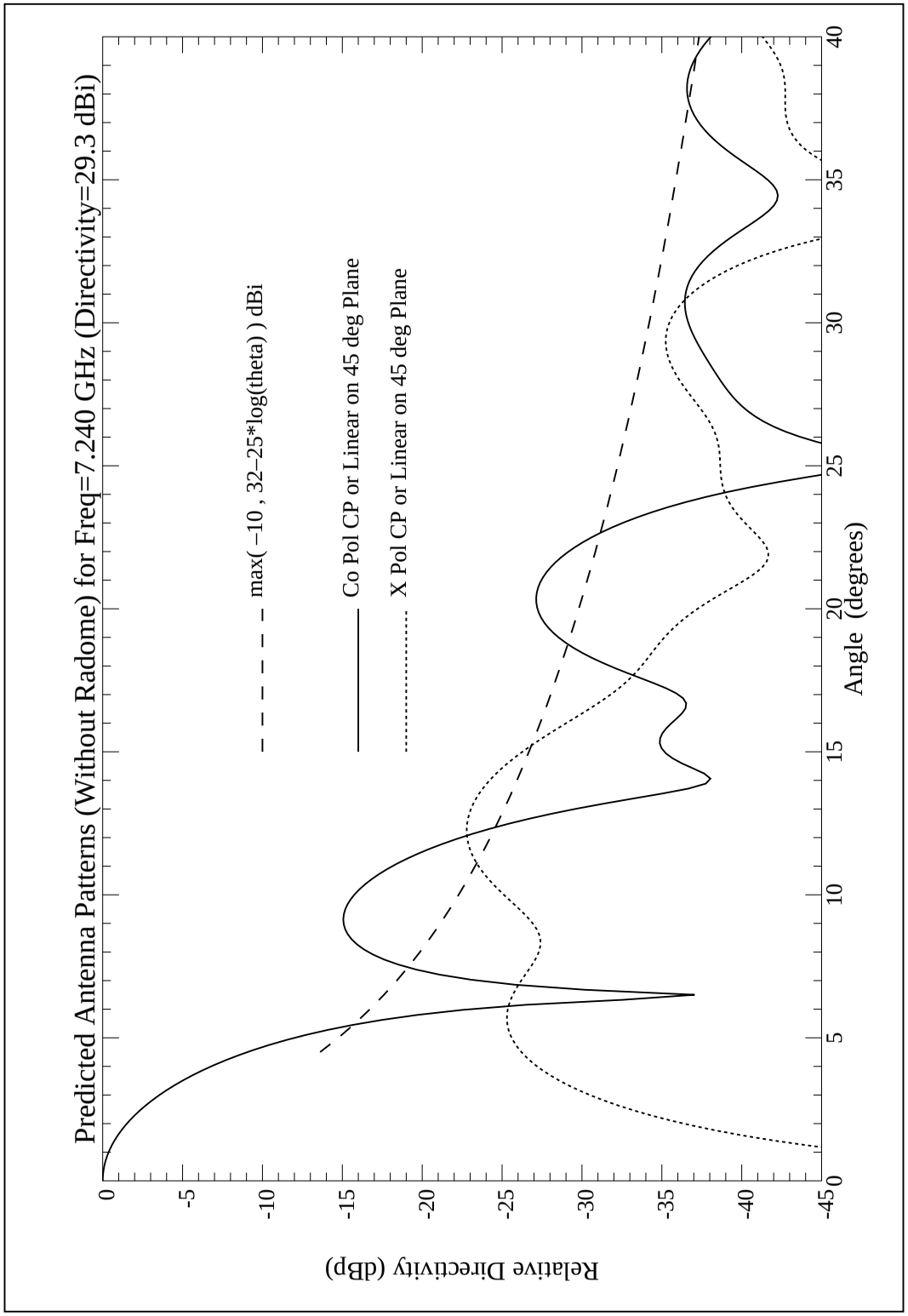

Figure 22: Antenna Patterns for 7.240 GHz

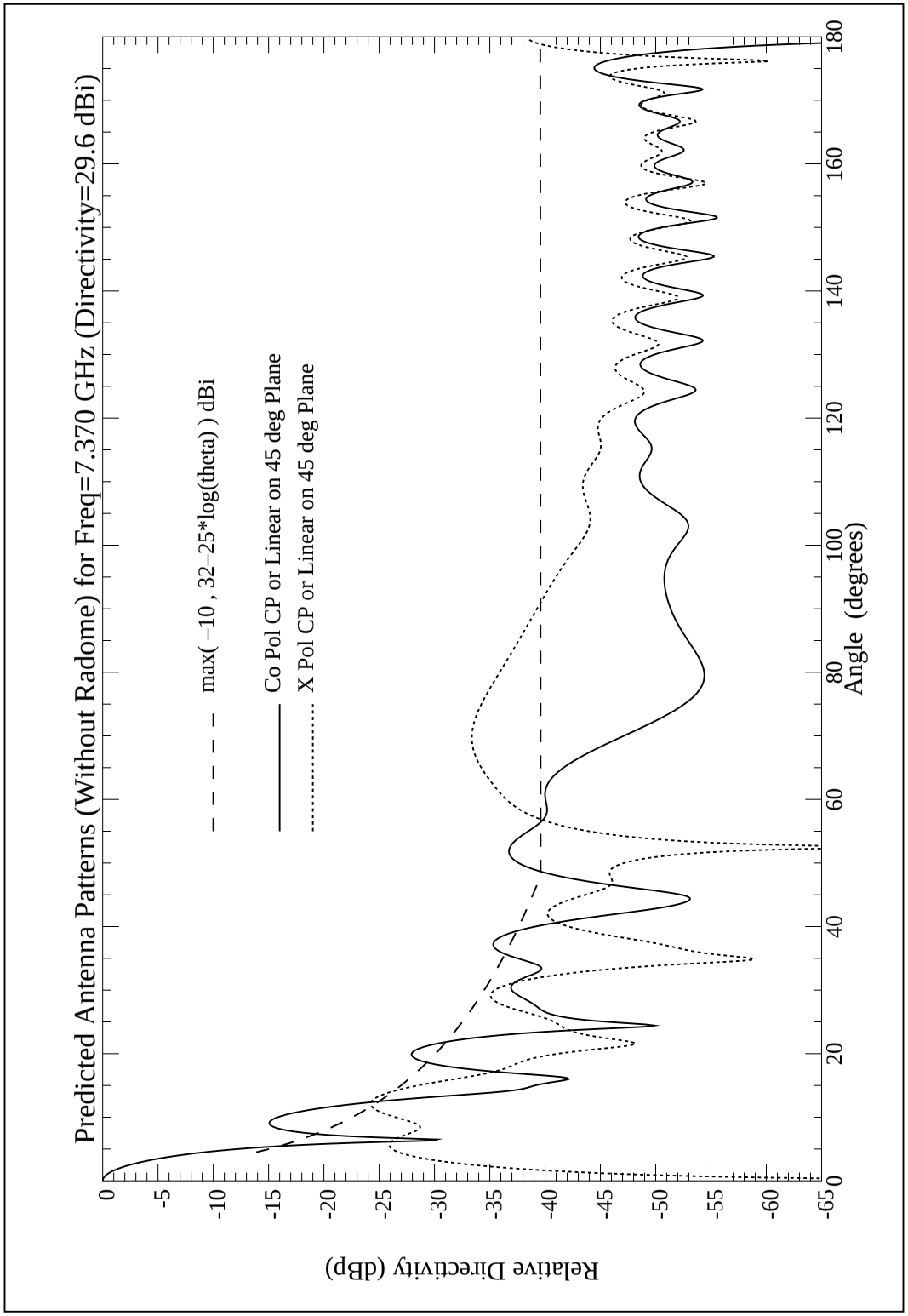

Figure 23: Antenna Patterns for 7.370 GHz

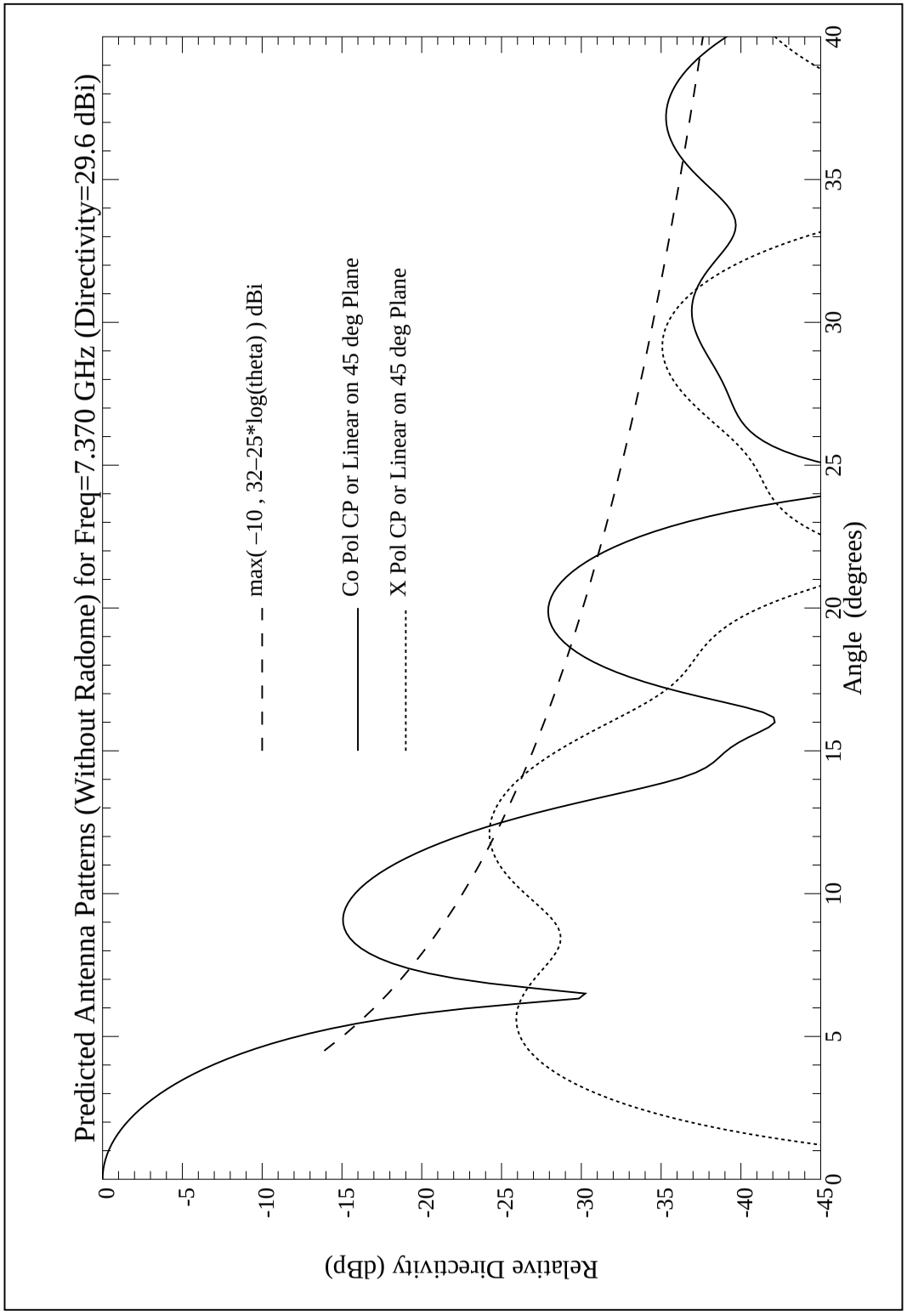

Figure 24: Antenna Patterns for 7.370 GHz

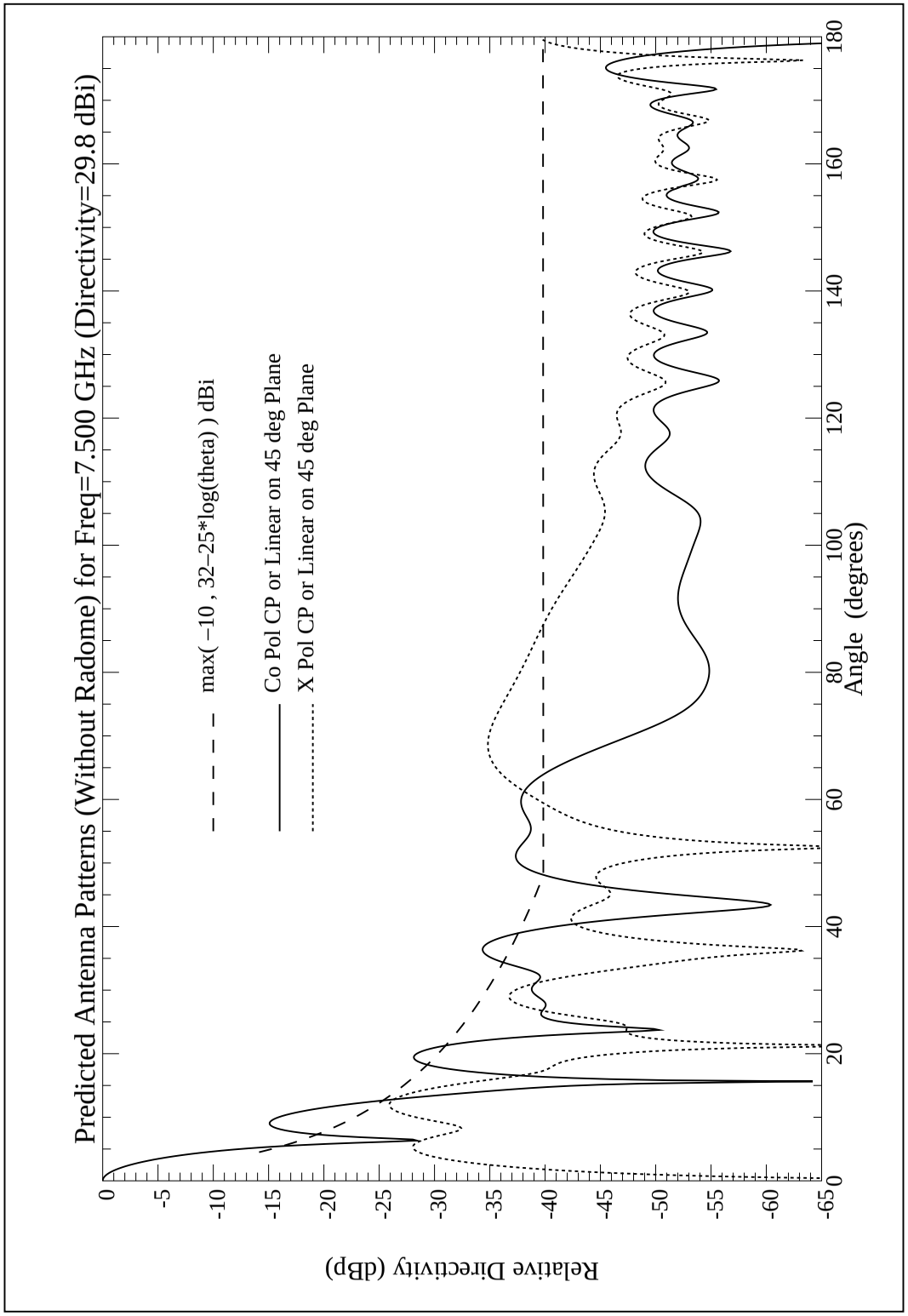

Figure 25: Antenna Patterns for 7.500 GHz

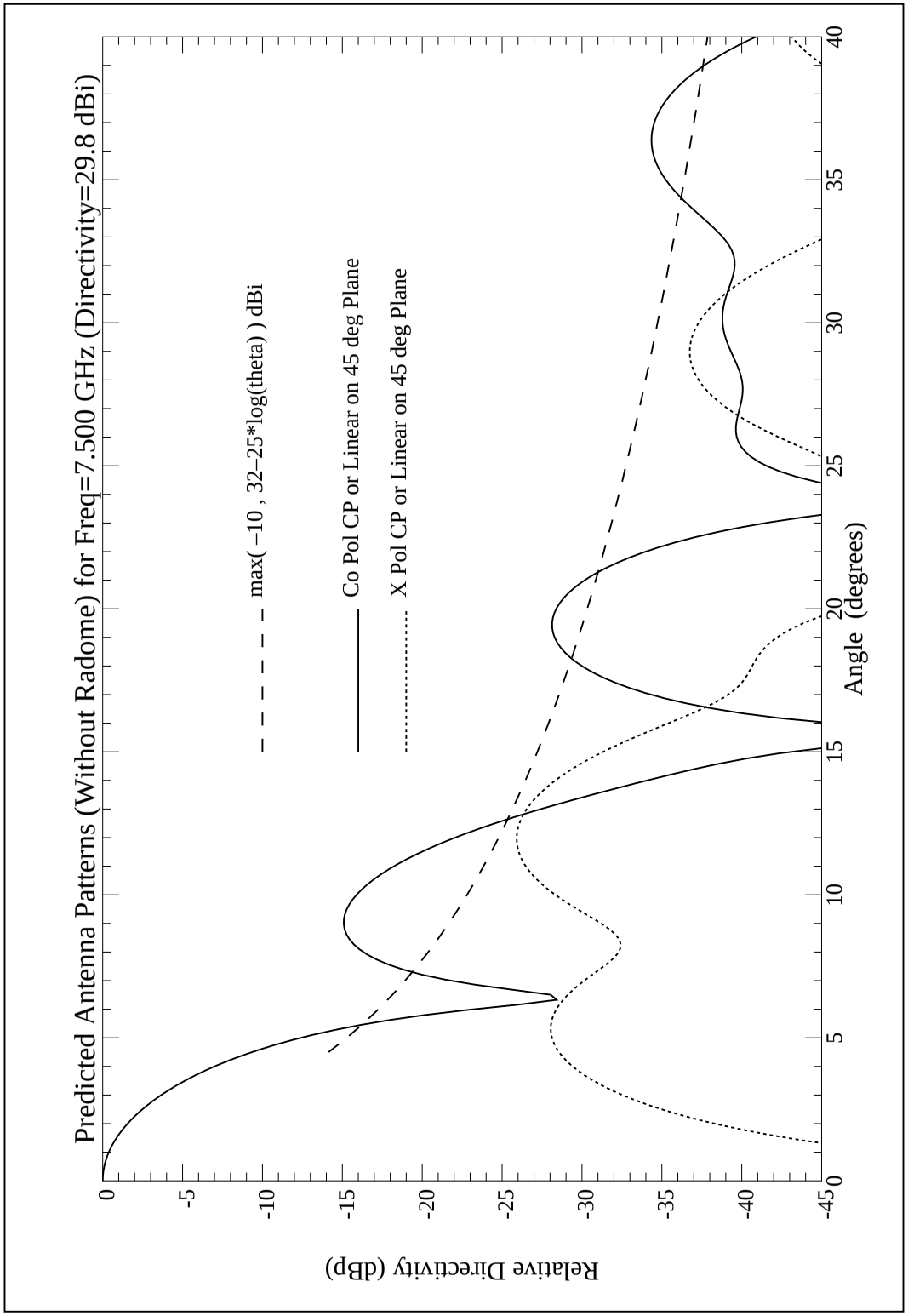

Figure 26: Antenna Patterns for 7.500 GHz

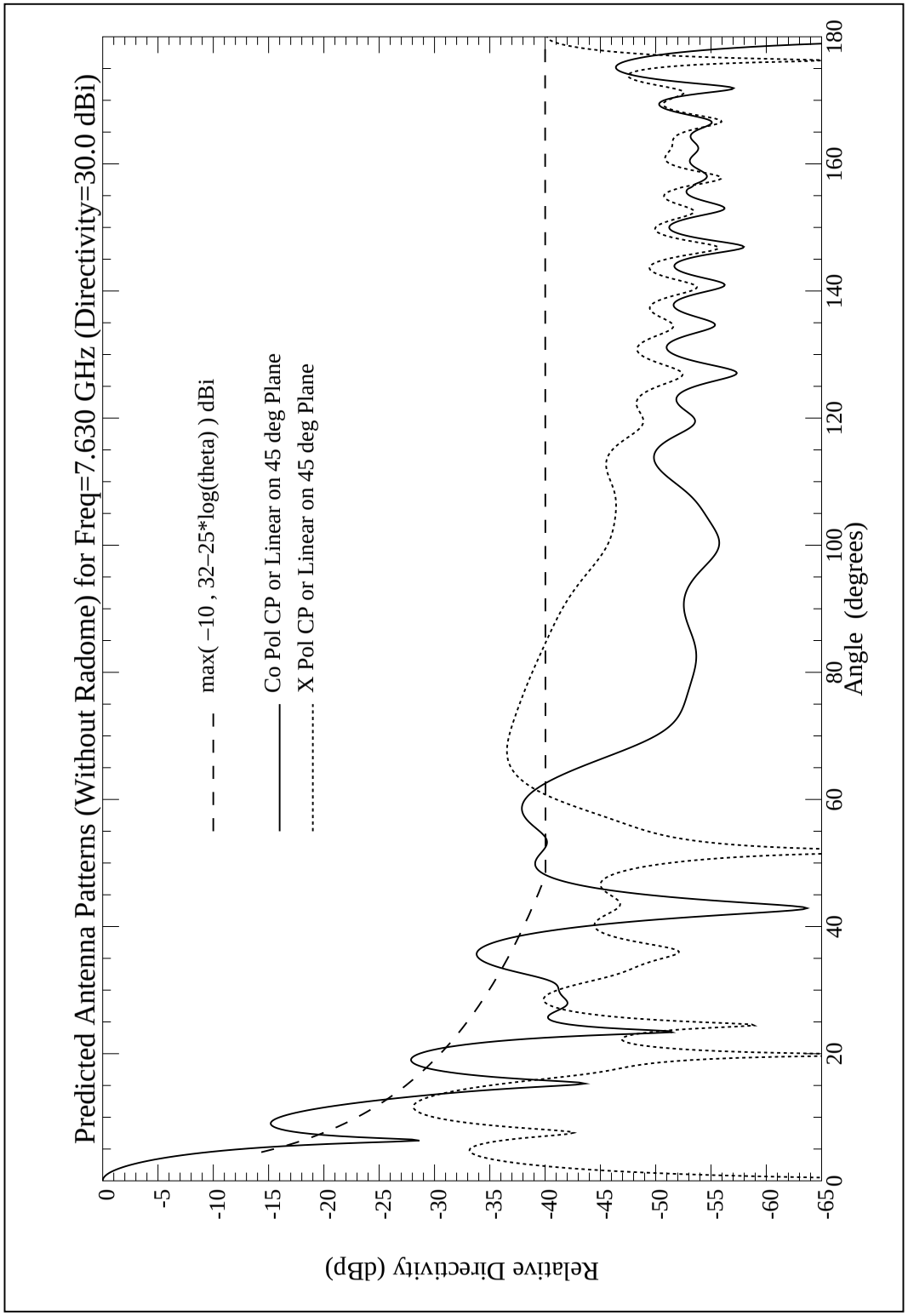

Figure 27: Antenna Patterns for 7.630 GHz

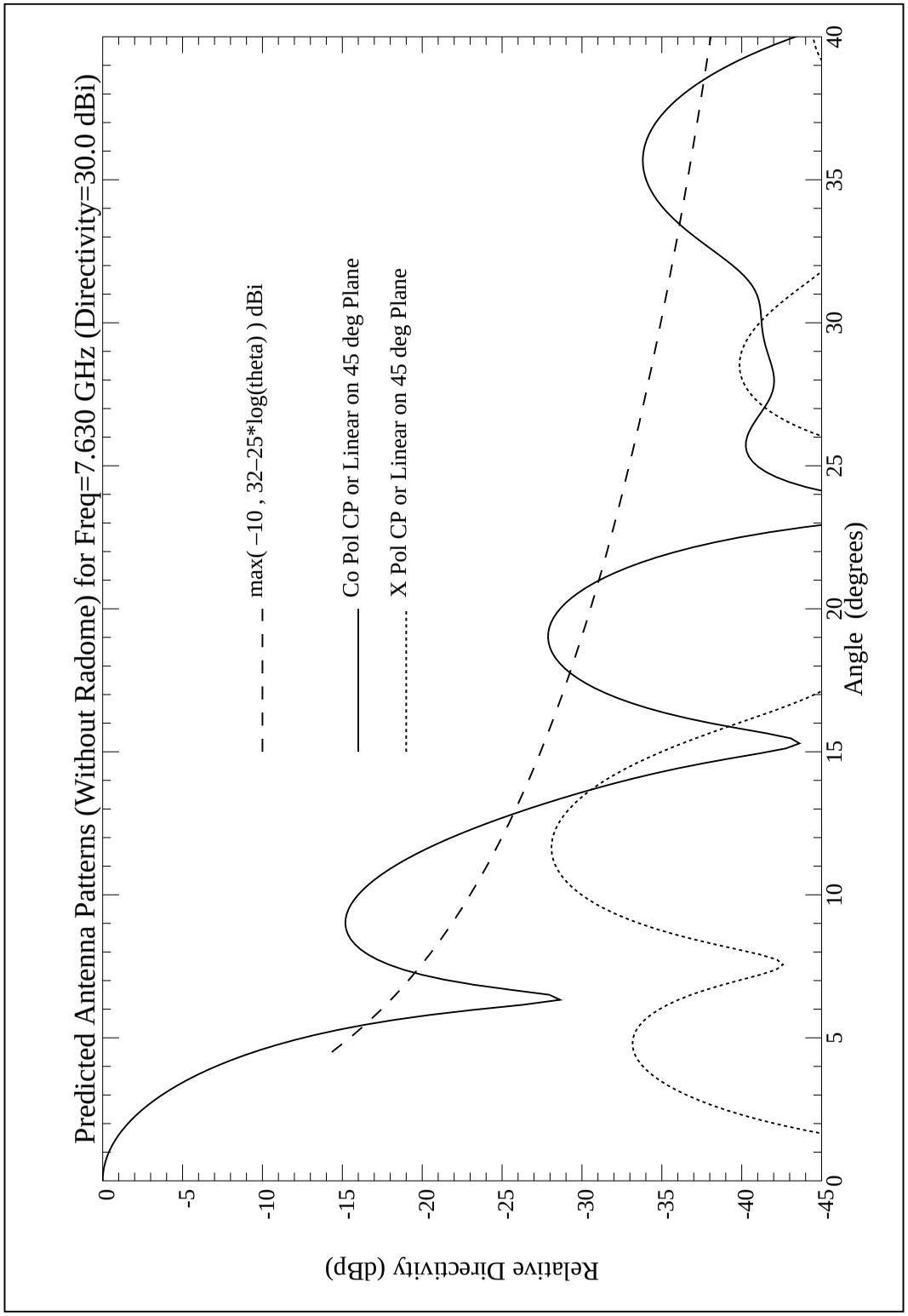

Figure 28: Antenna Patterns for 7.630 GHz

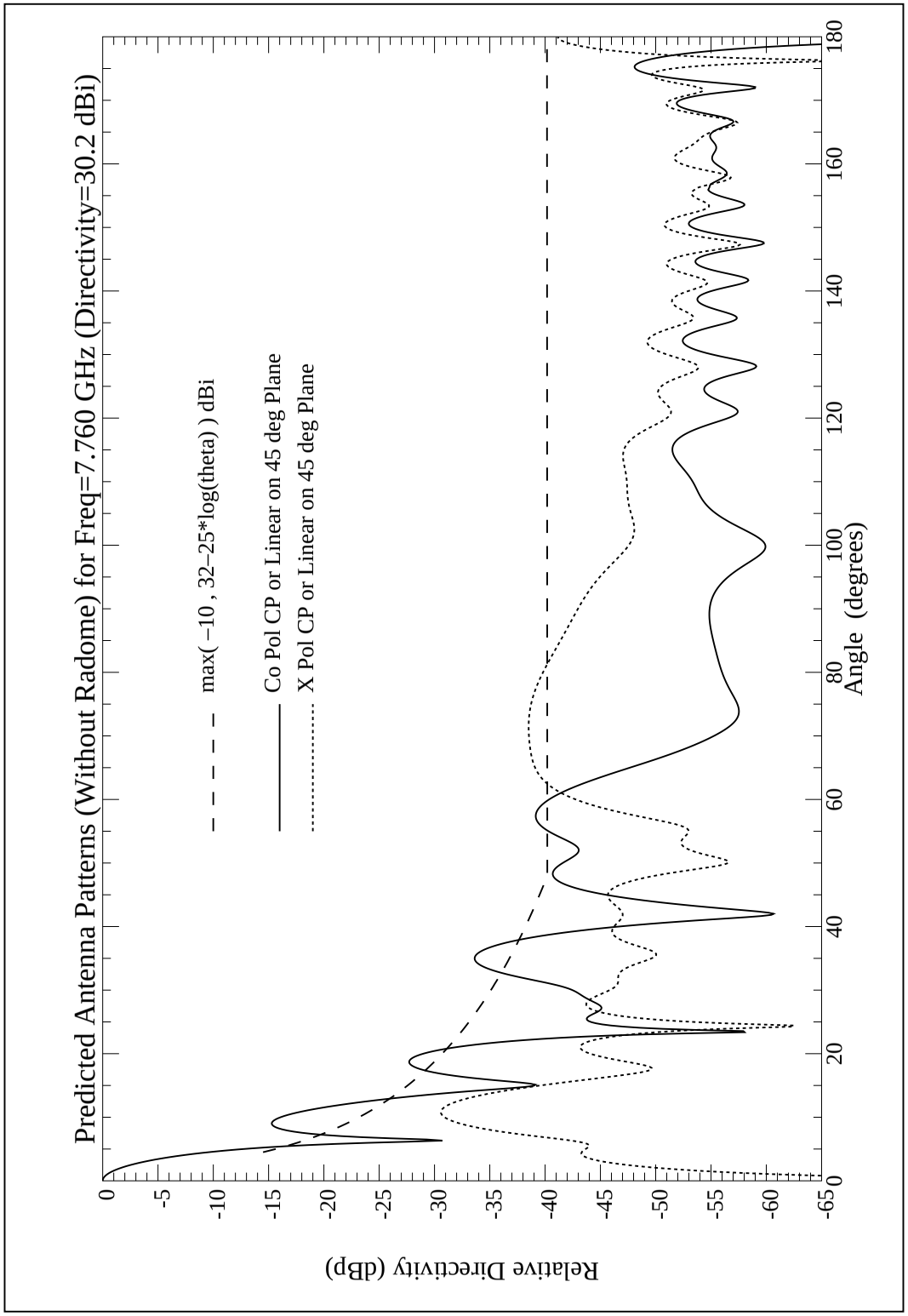

Figure 29: Antenna Patterns for 7.760 GHz

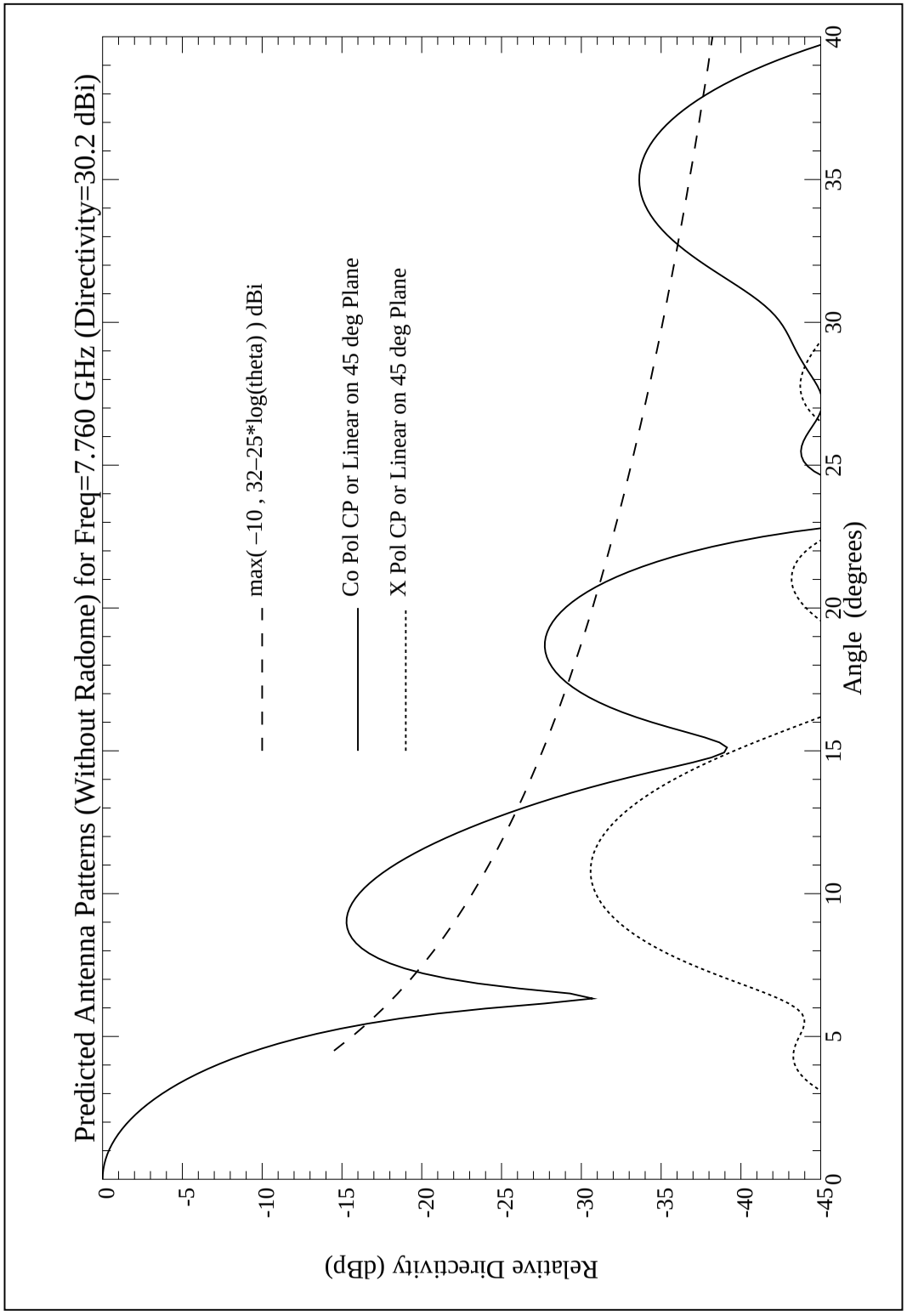

Figure 30: Antenna Patterns for 7.760 GHz

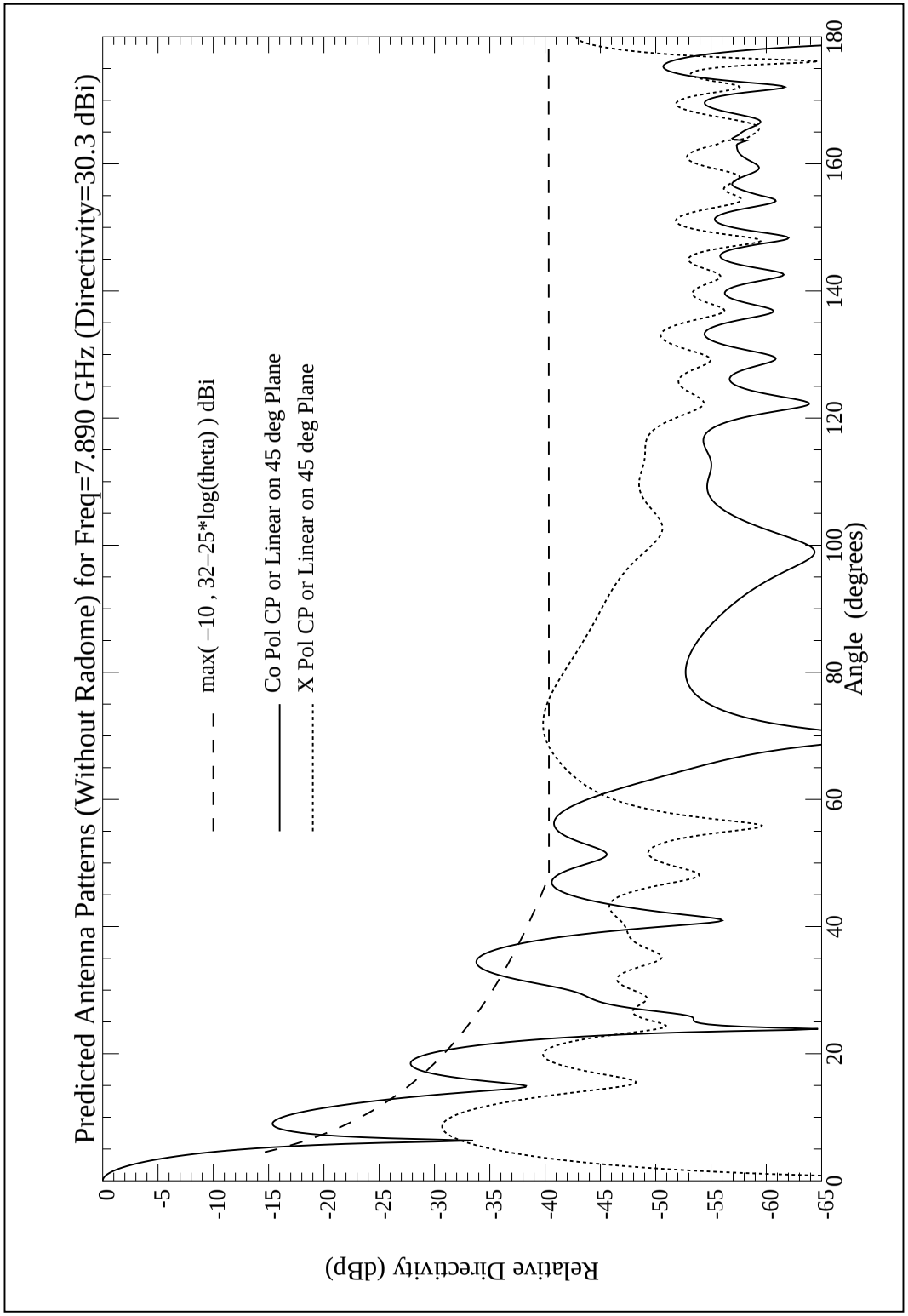

Figure 31: Antenna Patterns for 7.890 GHz

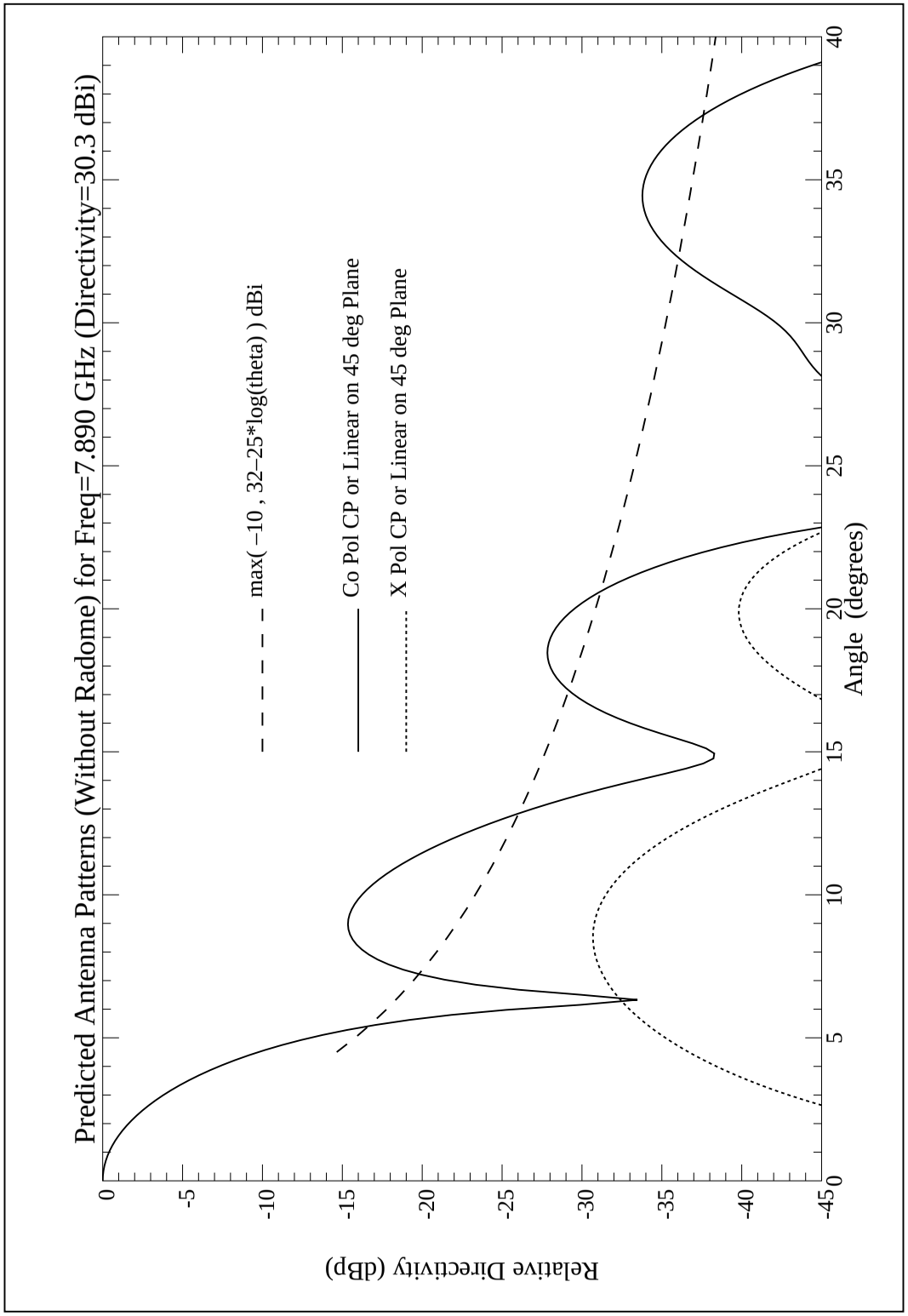

Figure 32: Antenna Patterns for 7.890 GHz

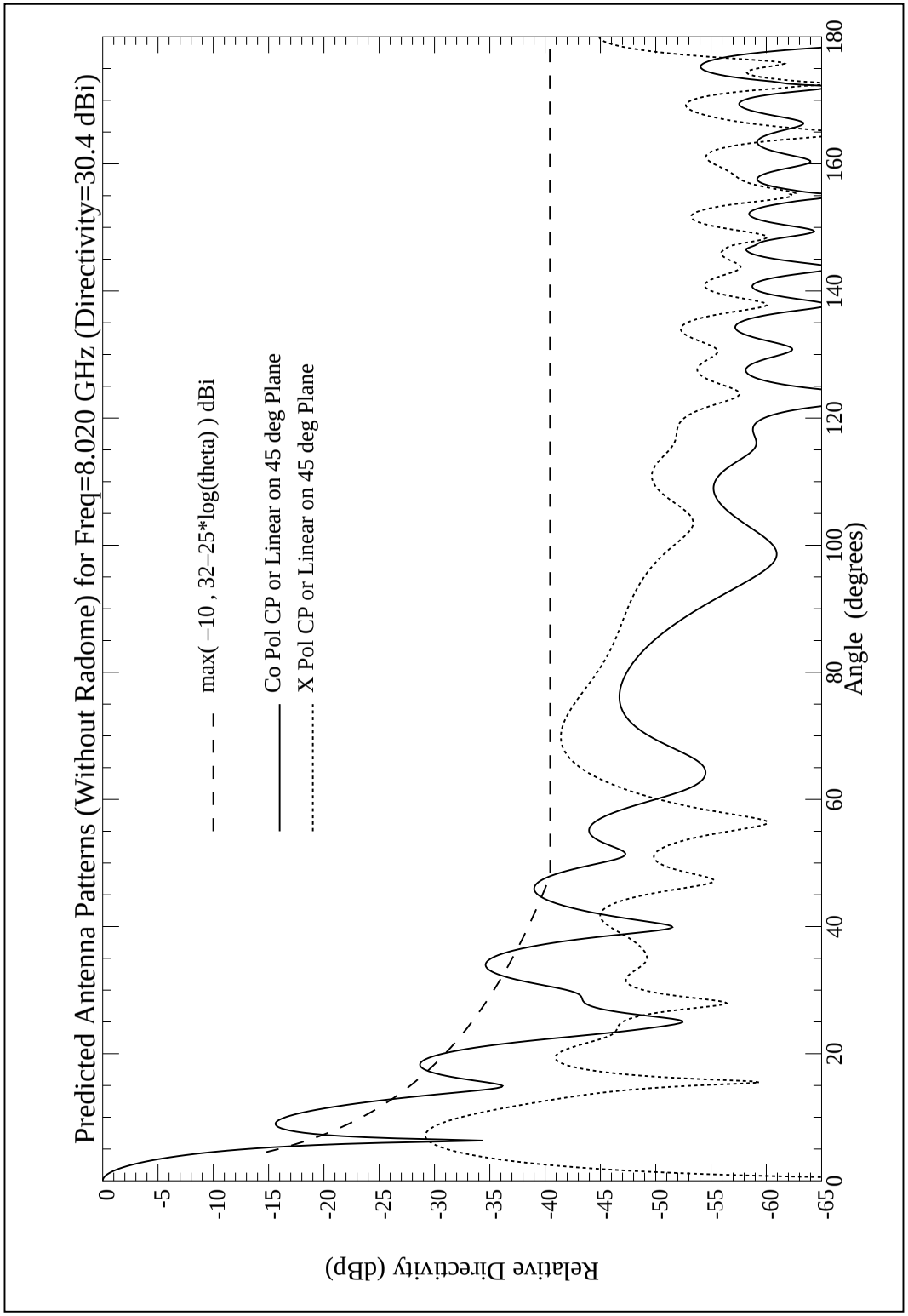

Figure 33: Antenna Patterns for 8.020 GHz

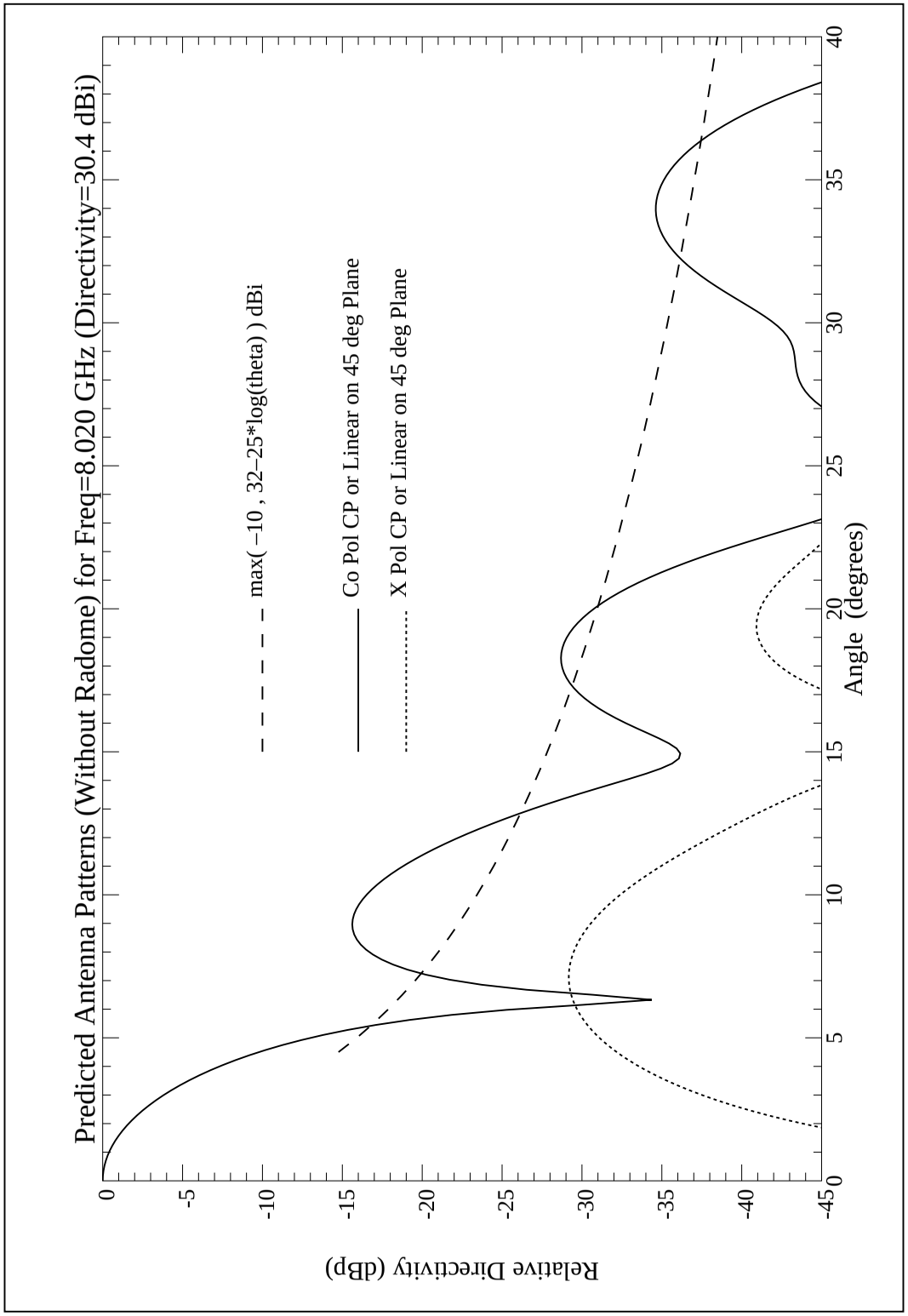

Figure 34: Antenna Patterns for 8.020 GHz

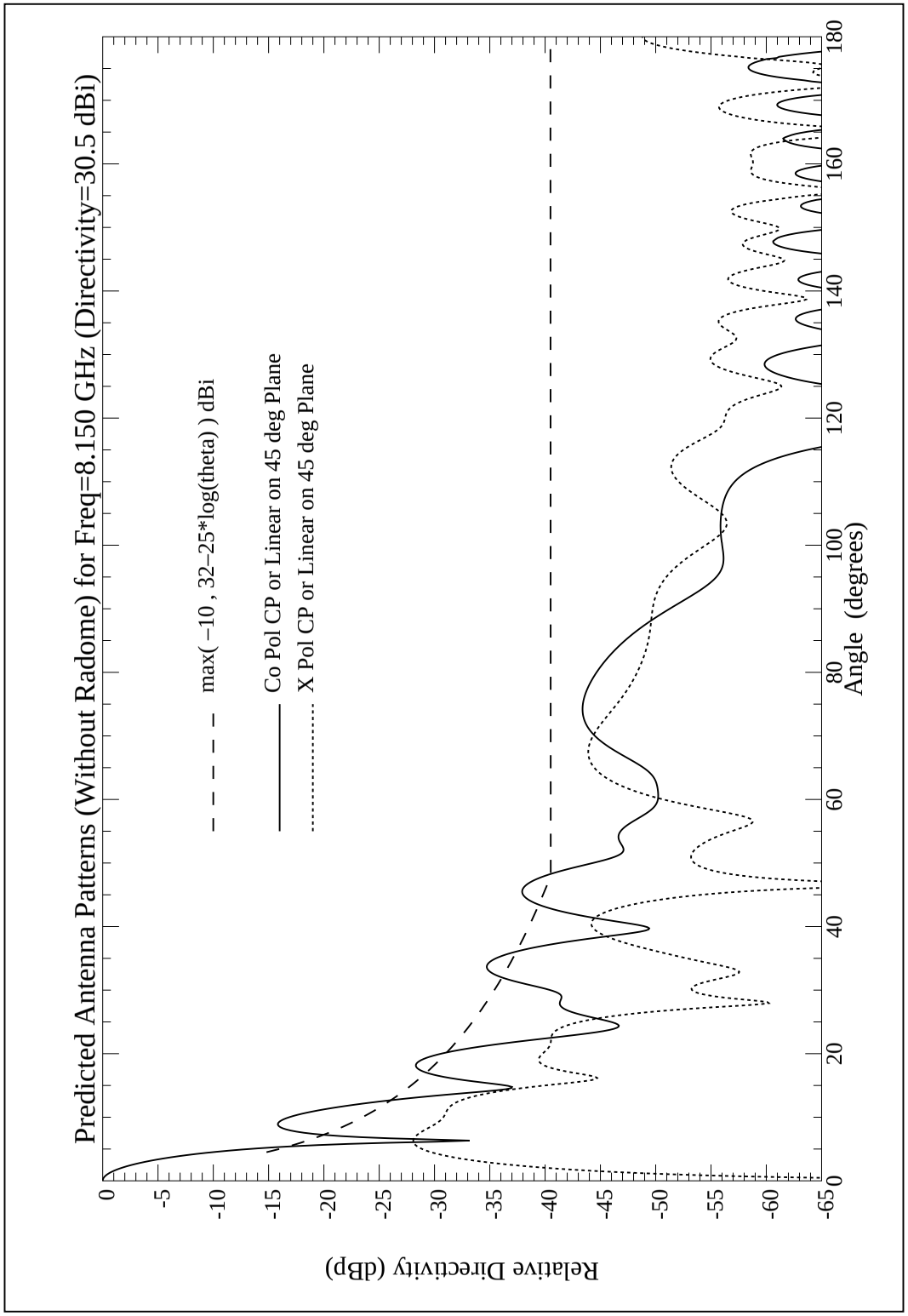

Figure 35: Antenna Patterns for 8.150 GHz

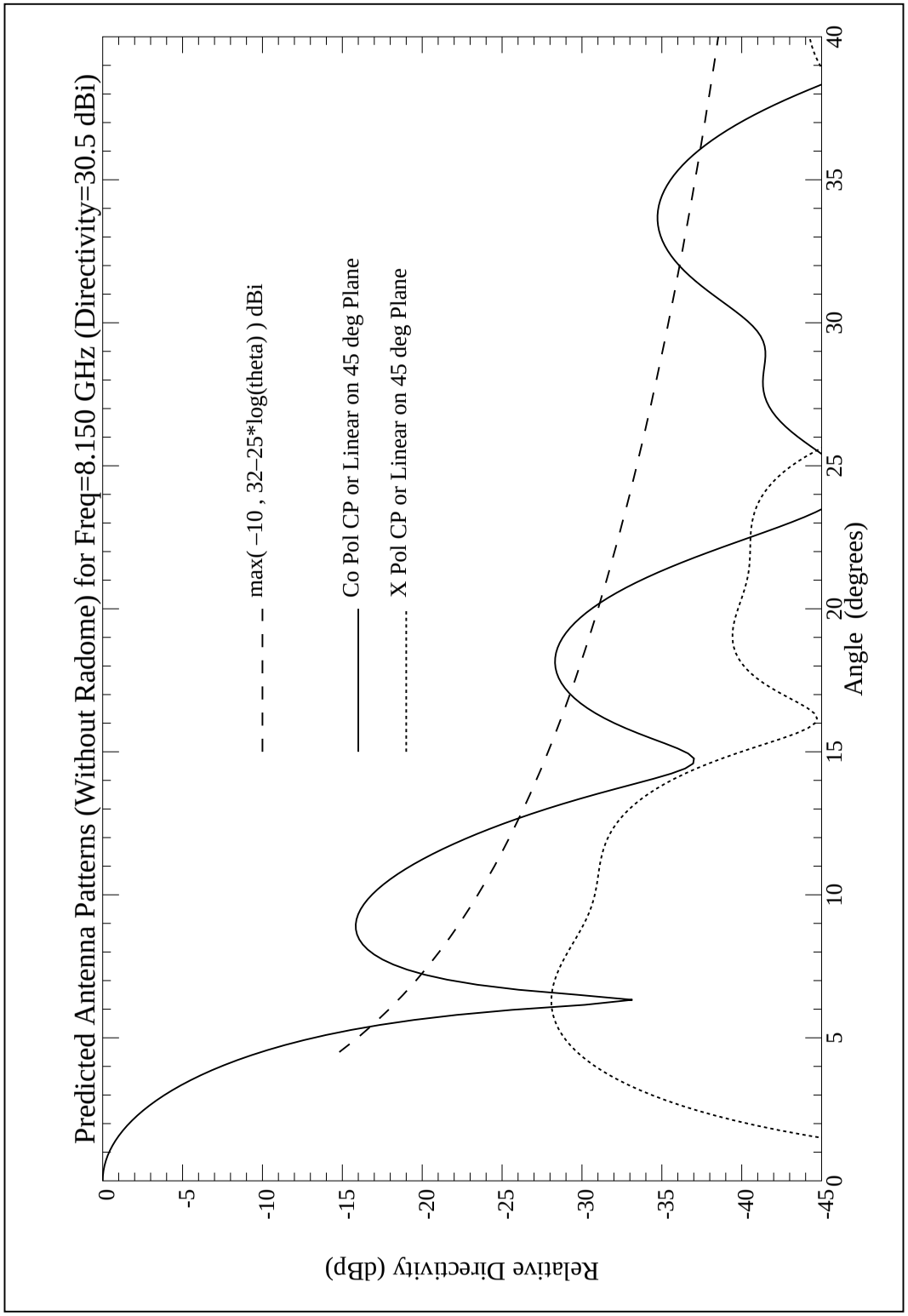

Figure 36: Antenna Patterns for 8.150 GHz

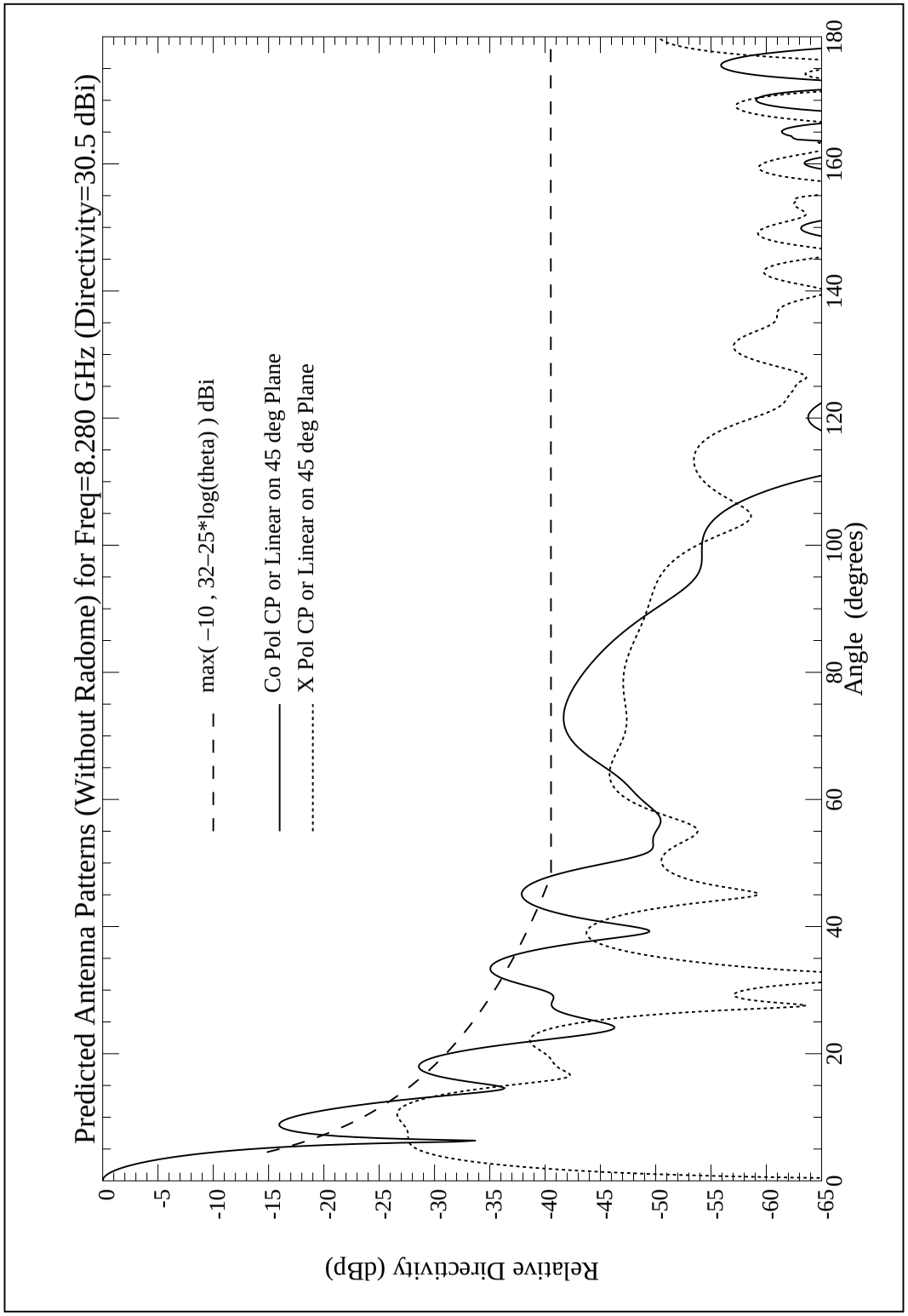

Figure 37: Antenna Patterns for 8.280 GHz

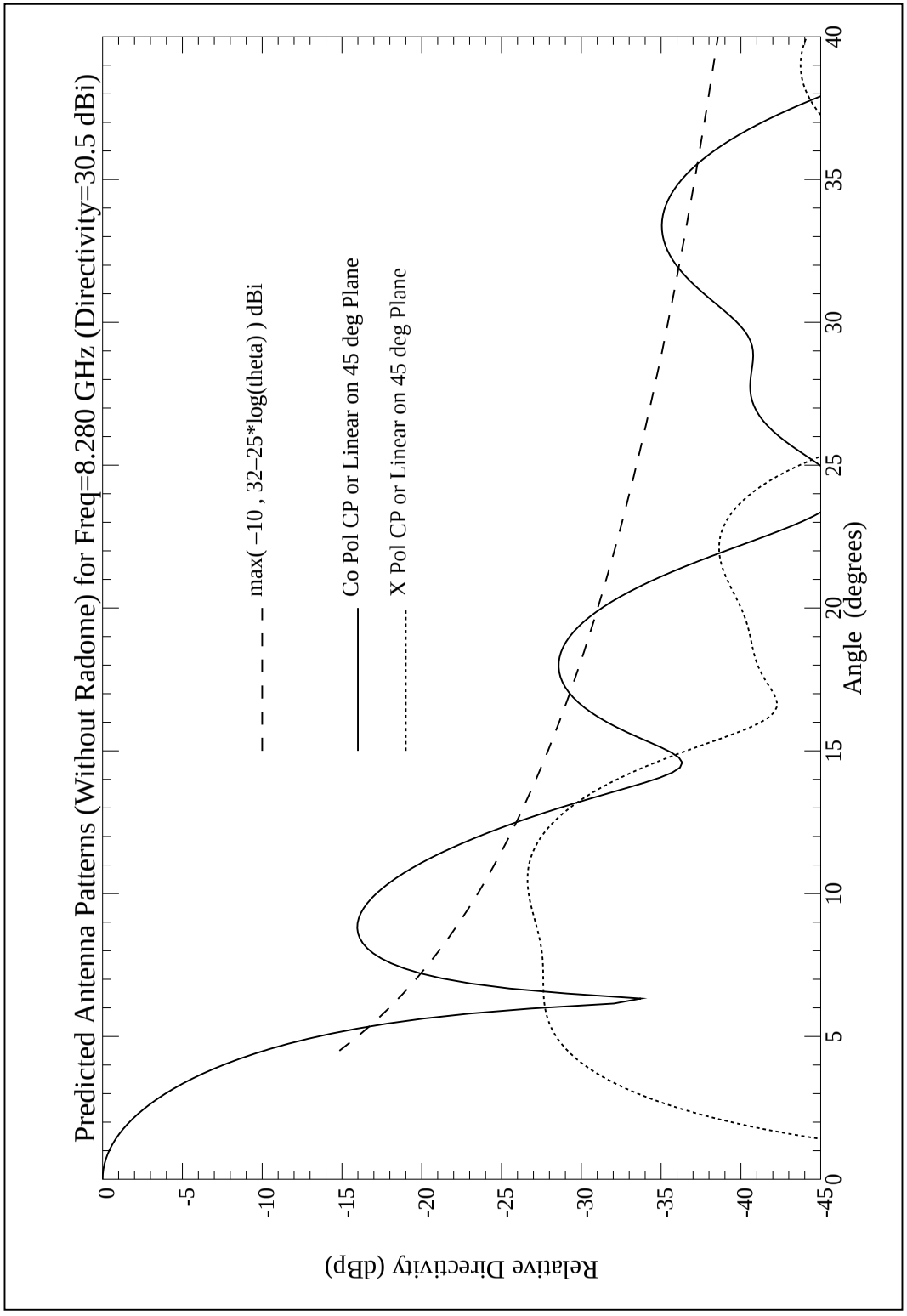

Figure 38: Antenna Patterns for 8.280 GHz

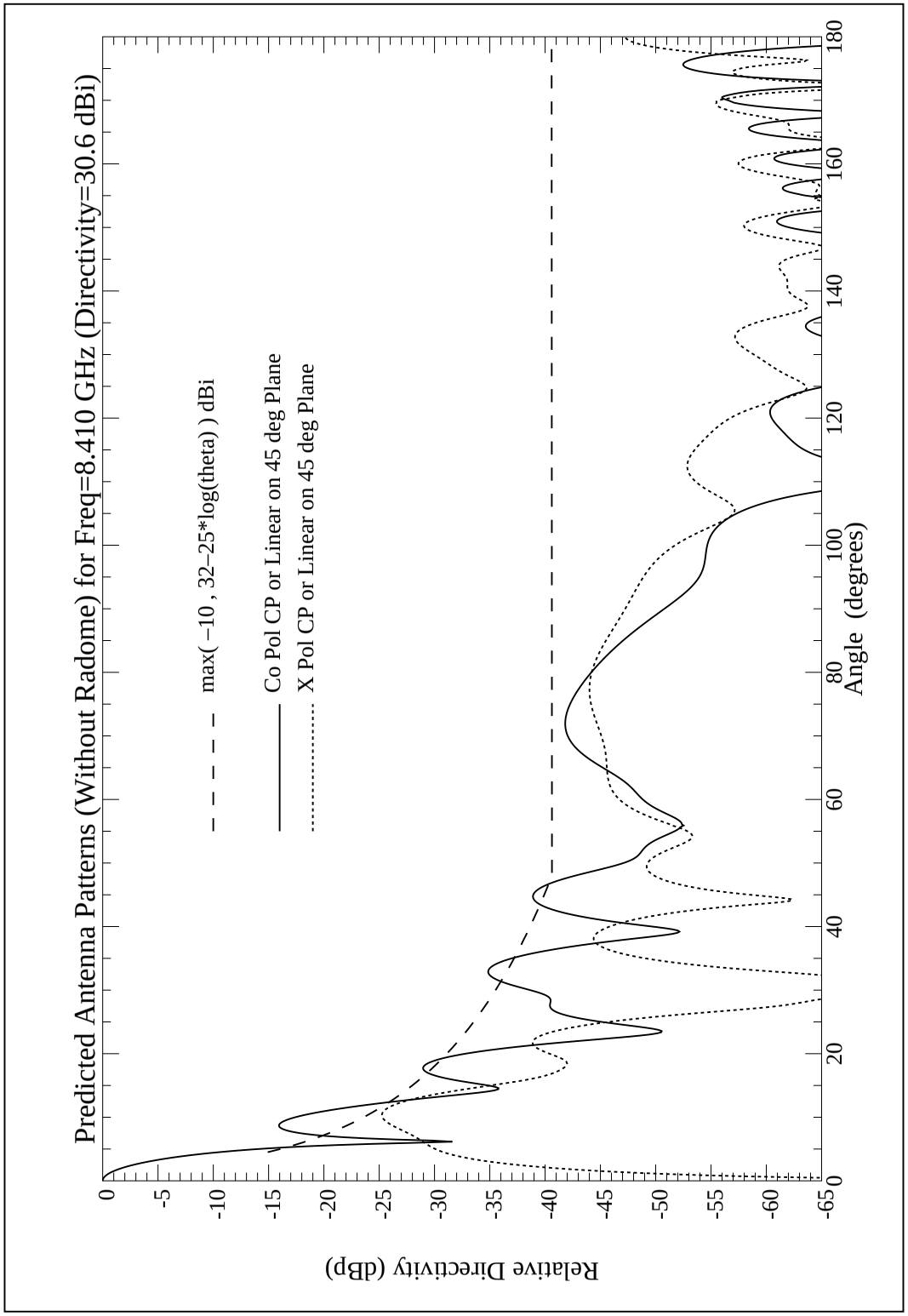

Figure 39: Antenna Patterns for 8.410 GHz

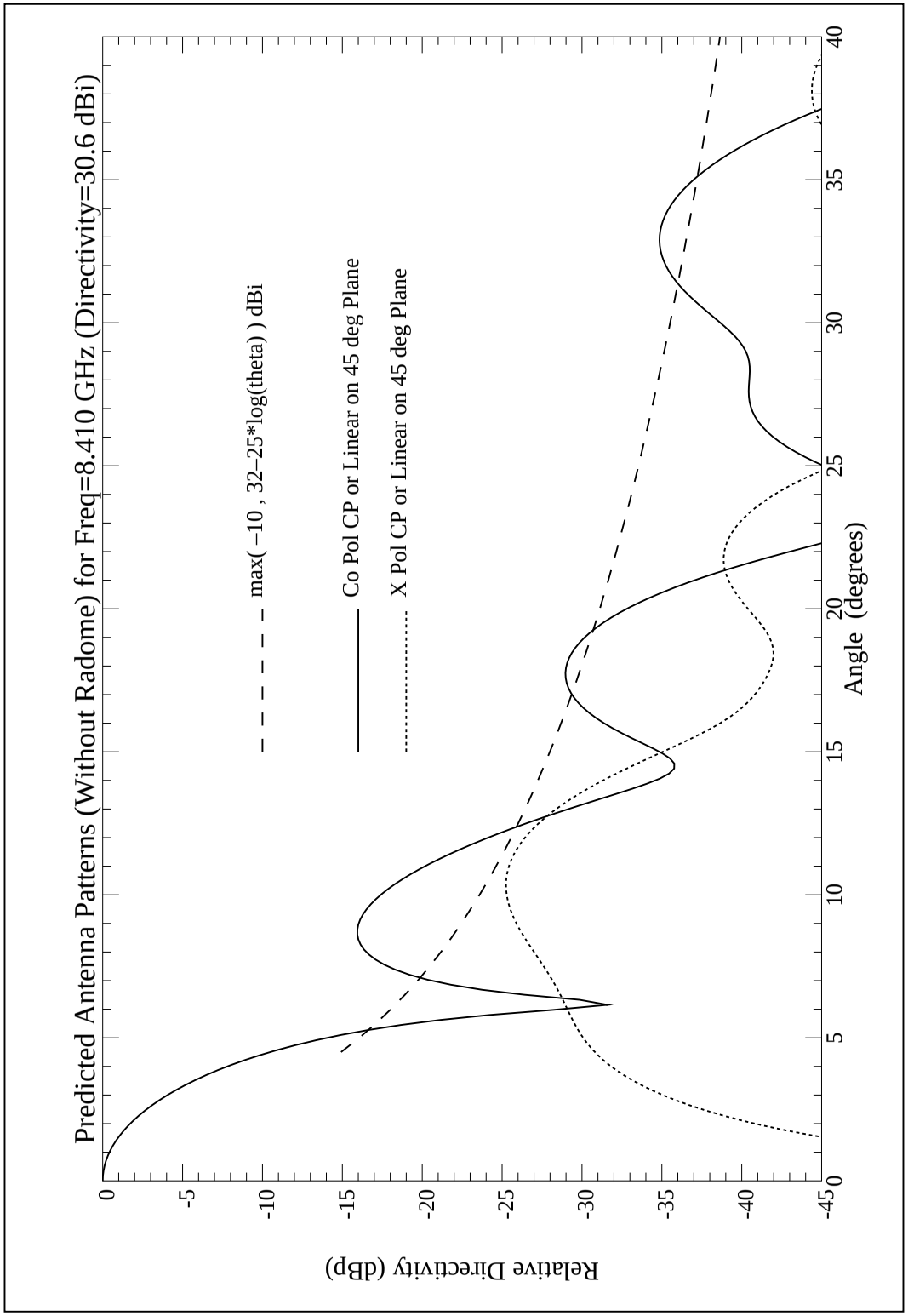

Figure 40: Antenna Patterns for 8.410 GHz