CHAMELEON ANTENNA ENGINEERING

CHA SKYLOOP 40
Engineering Performance Brief

Seven-band EZNEC far-field interpretation
30 ft above Real Ground

11.4 dBi

Highest modeled maximum gain in the supplied set - 10 meters

Broad regional coverage on the lower bands. Concentrated, multi-direction upper-band DX performance.

Version 1.0.0 - 21 July 2026

Engineering boundary: this document interprets supplied model outputs. It does not certify measured realized gain, contact range, or superiority over another antenna.

EXECUTIVE SUMMARY

What the model establishes

The supplied EZNEC far-field plots show a coherent and technically expected transition. At 7 and 10.1 MHz, the loop provides broad azimuth coverage and strong high-angle radiation. At 14 MHz the elevation pattern begins moving energy away from the zenith. From 18.1 through 28 MHz, the electrically larger loop forms increasingly concentrated azimuth and elevation lobes, with modeled maximum gain rising into the 9.4 to 11.4 dBi range.

This is a powerful product story because the same installed antenna changes operating character with frequency: regional and NVIS-oriented coverage on 40 meters, broad general-purpose coverage on 30 and 20 meters, and directional upper-HF DX performance in favored headings.

Approved central statement

At 30 ft over Real Ground, the modeled CHA SKYLOOP 40 transitions from broad, high-angle lower-band coverage to concentrated, lower-angle upper-band lobes, reaching 11.4 dBi modeled maximum gain on 10 meters in favored directions.

Important claim limit

- The plots support a model-specific gain statement, not a universal installed-performance guarantee.

- The results do not yet prove that this is Chameleon Antenna's highest-gain antenna because other products have not been compared under identical model assumptions.

- No communication distance can be guaranteed from an antenna pattern alone.

METHODOLOGY

Model assumptions and missing controls

Known from the supplied materials

- Antenna: CHA SKYLOOP 40, nominal 141 ft horizontal loop.

- Height: 30 ft above ground.

- Ground selection: Real Ground.

- Frequencies: 7.0, 10.1, 14.0, 18.1, 21.0, 24.9, and 28.0 MHz.

- Outputs: total-field azimuth and elevation patterns plus the reported maximum gain and available F/B or F/S ratio.

Not exposed in the supplied screenshots or PowerPoint

- Original EZNEC model geometry, segment count, wire conductivity and loss settings.

- Ground conductivity and dielectric constant used by the Real Ground selection.

- Source position, transformer representation, feed-line model, and any common-mode current controls.

- Whether the gain values include transformer and feed-line insertion losses.

- Absolute azimuth heading of the physical loop sides and major lobes.

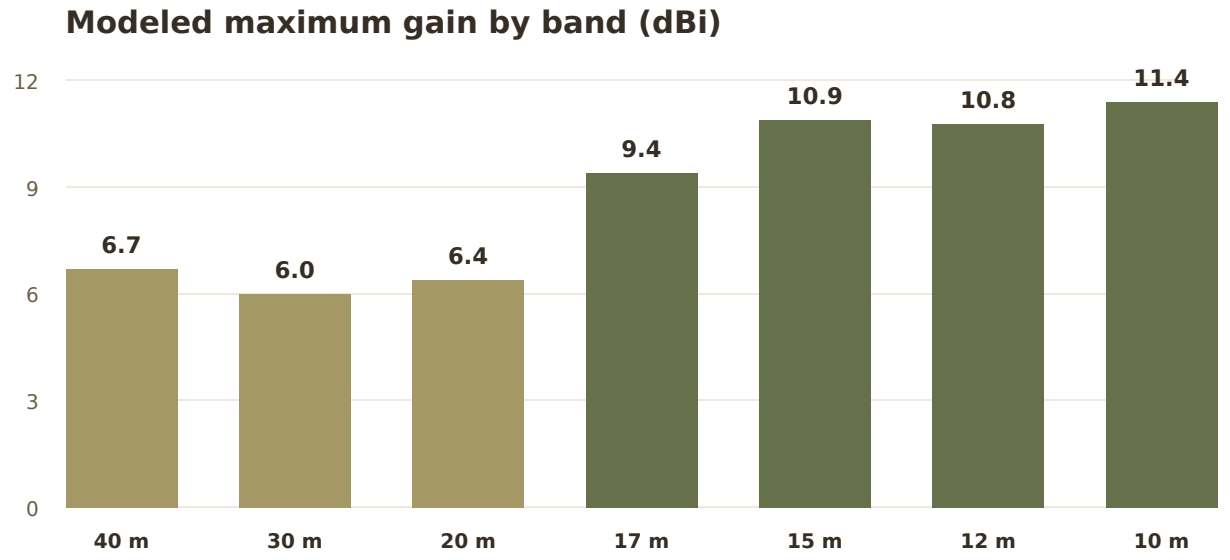
- Exact elevation angle of maximum radiation as a numerical output.

Until the original .EZ file or complete model report is archived, this brief preserves the supplied outputs faithfully but does not claim full reproducibility.

PERFORMANCE OVERVIEW

Modeled gain across seven HF bands

Band	Frequency	Modeled max gain	Pattern ratio	Polarization
40 m	7.0 MHz	6.7 dBi	F/S 0.0 dB	Mixed
30 m	10.1 MHz	6.0 dBi	F/B 0.1 dB	Horizontal
20 m	14.0 MHz	6.4 dBi	F/S 0.0 dB	Horizontal
17 m	18.1 MHz	9.4 dBi	F/S 2.1 dB	Not stated in supplied slide
15 m	21.0 MHz	10.9 dBi	F/S 1.5 dB	Horizontal
12 m	24.9 MHz	10.8 dBi	F/B 1.4 dB	Not stated in supplied slide
10 m	28.0 MHz	11.4 dBi	F/B 3.2 dB	Not stated in supplied slide



All values are model outputs for the supplied 30 ft / Real Ground case; not measured field guarantees.

The gain trend is not a smooth broadband efficiency curve. It reflects how the loop's electrical circumference, current distribution, ground interaction, and pattern directivity change with frequency. Higher maximum gain on the upper bands is accompanied by narrower favored directions and deeper modeled nulls.

OPERATOR EDUCATION

How to read the radiation plots

Azimuth plot

The circular plan-view plot shows relative signal strength around the antenna at the model's selected elevation cut. A nearly circular outline indicates broad heading coverage. Petal-like lobes show directions of concentrated energy; spaces between lobes are relative nulls.

Elevation plot

The half-circle side-view plot shows energy versus launch angle above the horizon. High-angle energy supports shorter regional sky-wave paths and NVIS when ionospheric conditions permit. Lower-angle energy generally supports longer single-hop distances and DX, but propagation remains dependent on the ionosphere, terrain, time, season, solar conditions, and noise.

Normalized 0 dB pattern versus reported dBi

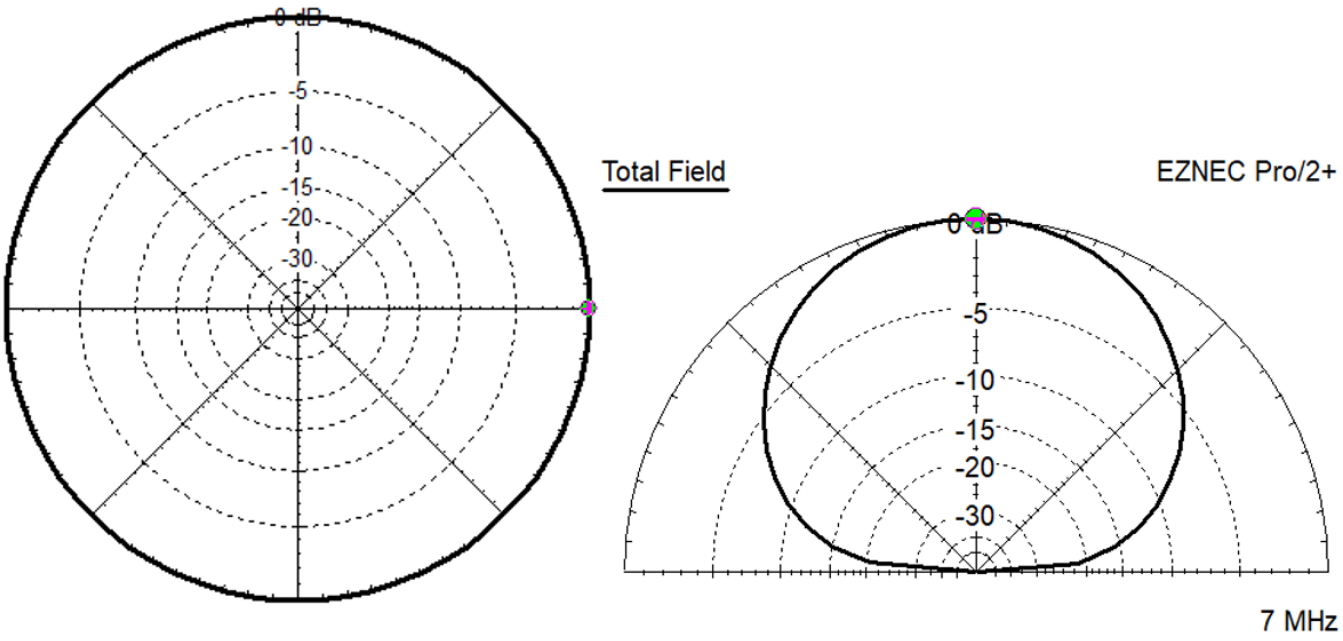
The outer 0 dB reference on each pattern is normalized to the strongest direction in that plot. It describes shape. The separate gain readout supplies the model's absolute maximum gain value. A normalized 0 dB label must never be mistaken for 0 dBi antenna gain.

Ground and installation

A horizontal antenna's elevation pattern is strongly affected by height and ground reflection. Real terrain, nearby conductors, unequal corner heights, irregular geometry, feed-line current, and losses can rotate, broaden, weaken, or partly fill the modeled lobes and nulls.

7.0 MHZ

40 m modeled performance



Frequency: 7 MHz Gain = 6.7 dBI F/S = 0.0 dB Polarization: Mixed

6.7 dBi	F/S 0.0 dB	Mixed
Modeled maximum gain	Reported pattern ratio	Reported polarization

Pattern character

Almost circular azimuth coverage with maximum radiation at very high elevation angles.

Best operating interpretation

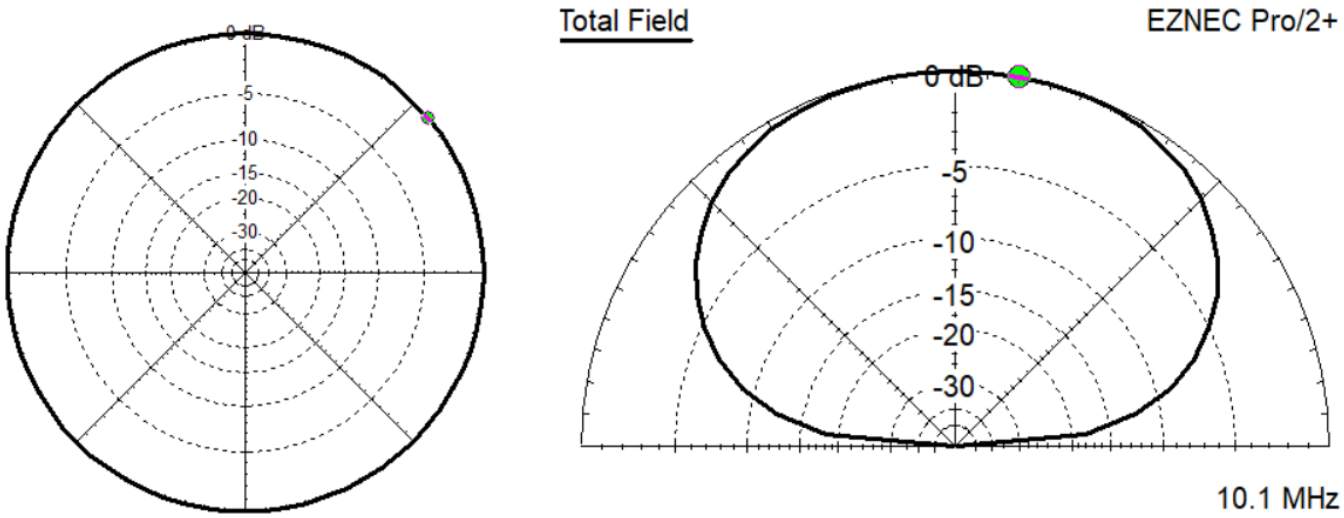
Regional and NVIS-oriented coverage. This is the lower-band coverage mode of the antenna, not its directional DX mode.

Claim and deployment caution

The model reports mixed polarization. Do not describe the 40 meter result as purely horizontal.

10.1 MHZ

30 m modeled performance



Gain: 6.0 dB F/B: 0.1 dB Polarization: Horizontal

6.0 dBi	F/B 0.1 dB	Horizontal
Modeled maximum gain	Reported pattern ratio	Reported polarization

Pattern character

Nearly omnidirectional azimuth coverage with a broad high-angle elevation lobe.

Best operating interpretation

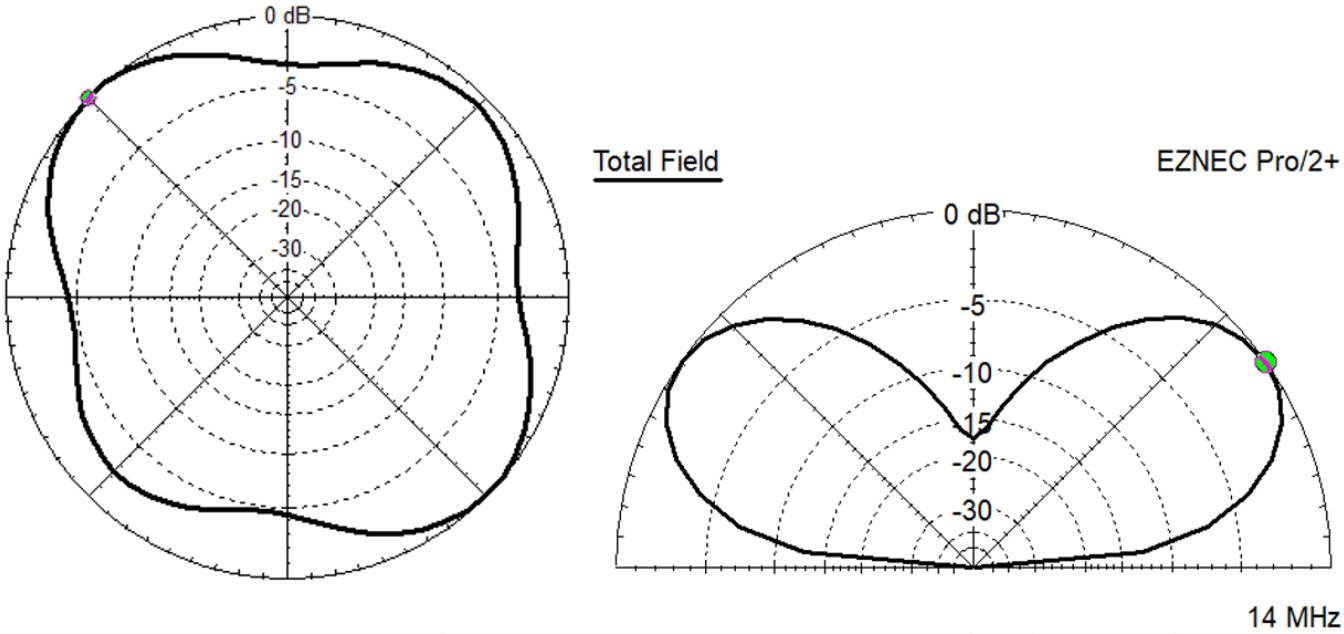
Broad regional and intermediate-distance coverage when propagation supports 30 meters.

Claim and deployment caution

30 meters is not listed as a documented transmit band in the current product manual. Treat this plot as engineering characterization unless product authorization is revised.

14.0 MHZ

20 m modeled performance



Frequency: 14 MHz Gain = 6.4 dBI F/S = 0.0 dB Polarization: Horizontal

6.4 dBi	F/S 0.0 dB	Horizontal
Modeled maximum gain	Reported pattern ratio	Reported polarization

Pattern character

Broad rounded-square azimuth coverage with strong medium-angle elevation lobes and a reduced zenith response.

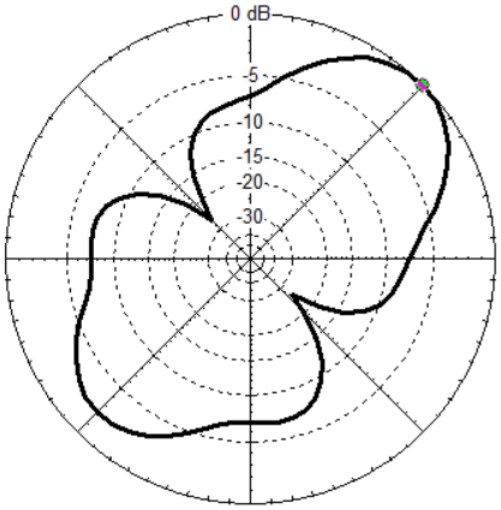
Best operating interpretation

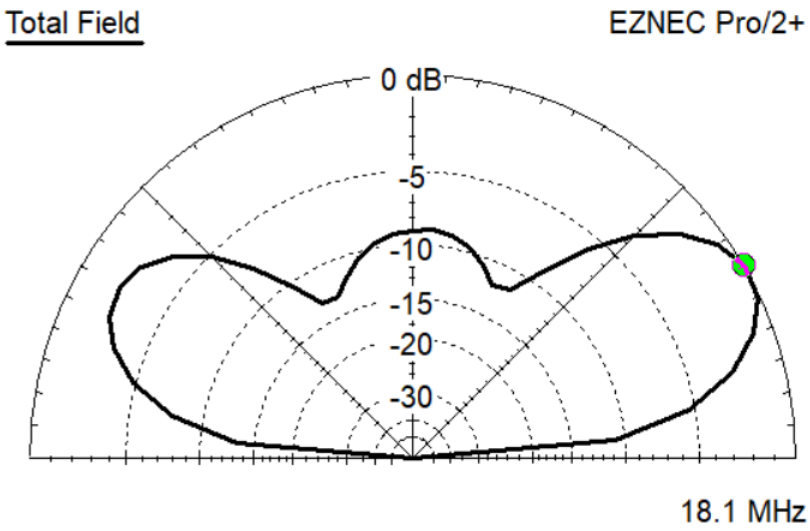
General-purpose regional and long-distance coverage with broad directional tolerance.

Claim and deployment caution

The deep modeled elevation notch will be changed by terrain, ground, geometry, losses, and local scattering.

17 m modeled performance





Gain: 9.4 dB F/S: 2.1 dB

9.4 dBi	F/S 2.1 dB	Not stated in supplied slide
Modeled maximum gain	Reported pattern ratio	Reported polarization

Pattern character

Three dominant azimuth lobes and pronounced lower-angle elevation energy.

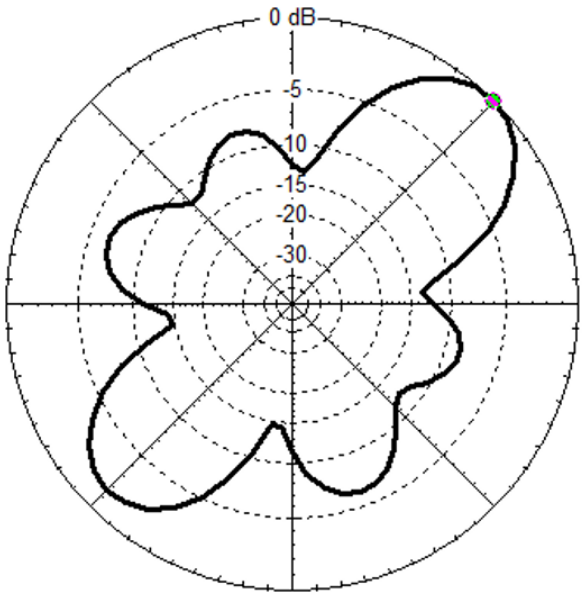
Best operating interpretation

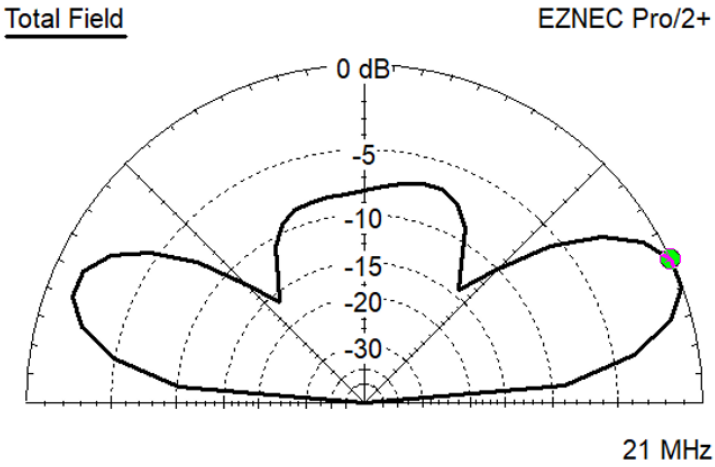
Directional DX performance in favored headings, with gain created by concentrating energy rather than increasing transmitter power.

Claim and deployment caution

Operators should map the physical loop orientation because upper-band lobe headings rotate with the installation.

15 m modeled performance





Frequency: 21 MHz Gain = 10.9 dBI F/S = 1.5 dB Polarization: Horizontal

10.9 dBi	F/S 1.5 dB	Horizontal
Modeled maximum gain	Reported pattern ratio	Reported polarization

Pattern character

Multiple azimuth lobes with strong low-angle elevation energy and additional higher-angle structure.

Best operating interpretation

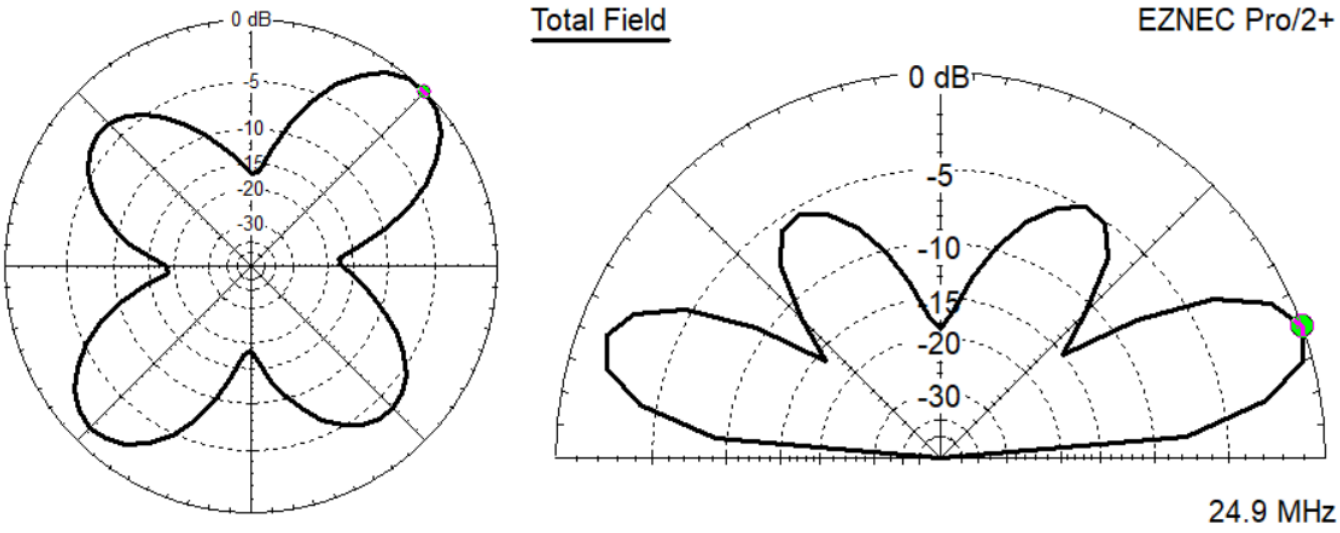
High modeled gain in several favored DX directions when 15 meters is open.

Claim and deployment caution

A null in a normalized plot is not a guaranteed dead zone. Terrain and scattering can fill modeled nulls.

24.9 MHZ

12 m modeled performance



Gain: 10.8 dB F/B: 1.4 dB

10.8 dBi	F/B 1.4 dB	Not stated in supplied slide
Modeled maximum gain	Reported pattern ratio	Reported polarization

Pattern character

Four principal azimuth lobes with low-angle primary elevation lobes and secondary higher-angle lobes.

Best operating interpretation

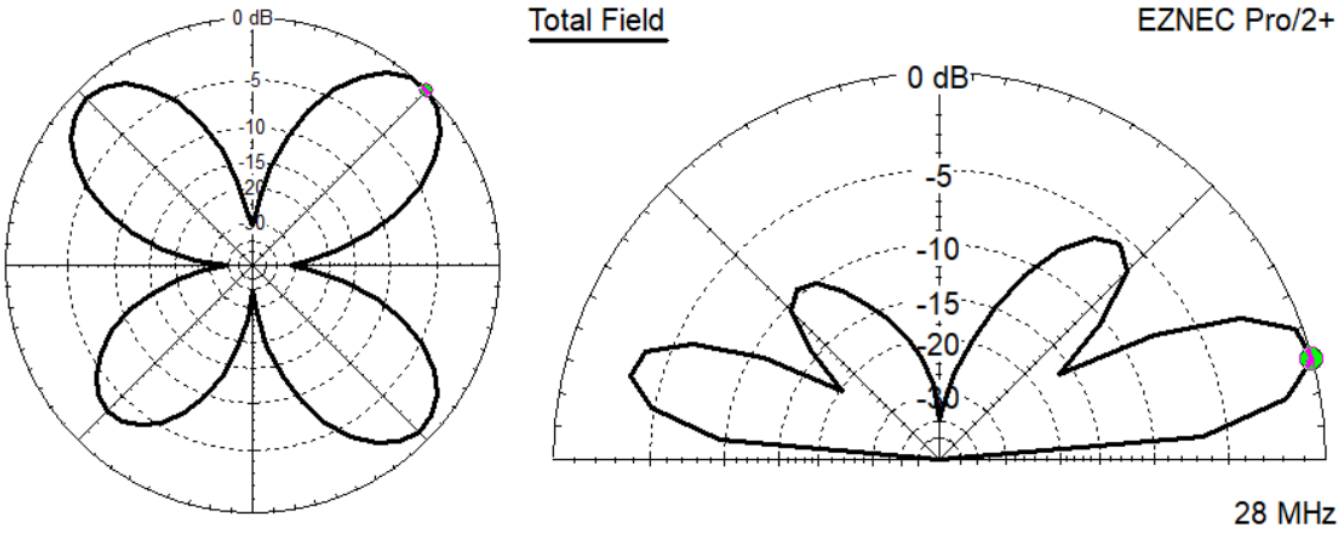
Concentrated multi-direction DX coverage on 12 meters with strong modeled maximum gain.

Claim and deployment caution

Tuner-supported operation does not make the feed system lossless. The tuner, coax, transformer, and installed SWR all remain part of the result.

28.0 MHZ

10 m modeled performance



Gain: 11.4 dB F/B: 3.2 dB

11.4 dBi	F/B 3.2 dB	Not stated in supplied slide
Modeled maximum gain	Reported pattern ratio	Reported polarization

Pattern character

Four narrow principal azimuth lobes with strong low-angle elevation energy and secondary lobes.

Best operating interpretation

The highest modeled maximum gain in the supplied set: 11.4 dBi in favored directions.

Claim and deployment caution

The strong directivity also creates orientation sensitivity. Broadside assumptions from a dipole do not describe this multi-lobed pattern.

DEPLOYMENT STRATEGY

Orientation, siting, and real-world verification

On 40 and 30 meters, physical orientation has relatively little effect on azimuth coverage in the supplied model. By 17 through 10 meters, orientation becomes an operating control because the principal lobes and relative nulls are pronounced.

Recommended commissioning procedure

- Record the compass heading of each side and corner when the loop is installed.

- Save analyzer sweeps for every intended band before full-power operation.

- Use on-air reports, reverse-beacon data, WSPR, FT8 reception reports, or controlled field-strength measurements to map favored headings.

- Repeat measurements after changing height, geometry, feed-line routing, support points, or nearby structures.

- Treat a modeled null as a relative weakness, not a guaranteed absence of communication.

Antenna orientation does not change ionospheric availability. A strong modeled lobe cannot create a path on a closed band, and a modeled null can still support communication through scattering, terrain reflection, and multi-path propagation.

FIELD USE

Band-to-mission planning guide

Band group	Pattern character	Primary planning role	Operator action
40 m	Broad / very high angle	Regional and NVIS-oriented coverage	Select frequency below the critical frequency when NVIS is required;
30 m	Broad / high angle	Regional and intermediate coverage	Engineering characterization only until the product's documented tra
20 m	Broad azimuth / medium-angle lobes	Global regional and DX work	Use broad coverage when exact destination heading is uncertain.
17-15 m	Multiple directional lobes	Upper-HF DX in favored headings	Record loop orientation and compare target heading to observed on-a
12-10 m	Sharper low-angle lobes	High-gain directional DX	Use a suitable tuner where required and recognize stronger heading s

Documented operating scope

The current CHA SKYLOOP 40 manual documents no-tuner operation on 40 and 20 meters and tuner-supported operation on 17, 15, 12, and 10 meters. The 30-meter model is technically informative but does not override the published operating scope.

Approved claims and claims to avoid

APPROVED	AVOID
- The supplied model reports 6.0 to 11.4 dBi maximum gain across 30 through 10 meters, with 6.7 dBi on 40 meters. - At 30 ft over Real Ground, the pattern transitions from broad high-angle coverage to concentrated upper-band directional lobes. - The 10-meter case reports the highest maximum gain in the supplied model set: 11.4 dBi. - The upper-band gain is directional; it is strongest in favored lobes and weaker between them. - Actual installed results will vary with geometry, height, ground, terrain, nearby conductors, feed-line behavior, matching loss, and propagation.	- Highest-gain antenna Chameleon makes - not proven without controlled comparison models. - 11.4 dBi on every heading - false; the pattern is strongly directional. - Guaranteed DX or a stated contact distance - propagation cannot be guaranteed. - Measured gain - these are model outputs, not calibrated field measurements. - Lossless matching or feed system - the supplied results do not document every modeled loss.

CONTROLLED COMPARISON

Next engineering validation step

To establish whether the CHA SKYLOOP 40 is the highest-gain Chameleon antenna, every candidate must be modeled under the same controlled conditions. That comparison should include the same frequency, height reference, ground constants, wire loss, feed-line treatment, matching loss, power normalization, and output definition.

Required model archive

- Original .EZ file for every SKYLOOP 40 frequency case.

- Complete geometry and segmentation report.

- Ground conductivity and dielectric constant.

- Wire and load loss settings.

- Source impedance, matching transformer representation, and feed-line model.

- Maximum gain, elevation angle, azimuth heading, efficiency, feedpoint impedance, and current distribution for each band.

Recommended comparison set

SKYLOOP 2.0, TDL, representative LEFS and OCF installations, BV, V-DIPOLE, and documented MPAS 2.0 configurations. Results should be presented as a model matrix, not as isolated best-case values.

Until that comparison is complete, the strongest accurate statement is: probably one of the highest modeled-gain antennas in the Chameleon lineup on the upper HF bands, with 11.4 dBi reported on 10 meters in the supplied model.

Sources and authority

Primary product sources

- CHA SKYLOOP 40 Operator's Manual, revision 2026-07-16.

- CHA SKYLOOP 40 Quick Start Guide and Flysheet, revision 2026-07-16.

- User-supplied EZNEC Pro/2+ far-field screenshots for 7, 14, and 21 MHz.

- User-supplied PowerPoint far-field plots for 10.1, 18.1, 24.9, and 28 MHz.

Engineering references consulted

- ARRL Antenna Book for Radio Communications, 24th edition: horizontal loops, ground effects, pattern interpretation, and elevation-angle behavior.

- ARRL Handbook for Radio Communications: multiband horizontal loops and the shift toward lower-angle radiation at higher frequencies.

- Jerry Sevick, Transmission Line Transformers: broadband transformer behavior and transformation ratios. Consulted for matching-network context only; the supplied model does not expose transformer implementation or loss.

This brief uses original Chameleon wording and original interpretation. It does not reproduce protected source passages. The official product manual remains the controlling source for assembly, power, tuning, and safety.

Revision control

Version 1.0.0 - 2026-07-21. Review after any change to the antenna geometry, matching transformer, wire assembly, documented bands, power ratings, model file, model assumptions, or field-validation data.