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524/527/527B Super High Gain Log-Periodic Antennas

Maximize gain and bandwidth with an exceptionally small structure.

Highly reliable communications on long-range circuits require antennas with high power gain at low take-off angles. In addition, ionospheric variations resulting in frequent changes in frequency make a wide frequency bandwidth desirable. The conventional approach to achieve wide-band, highly directive antennas has been to use multiple rhombic antennas, which rely heavily on end-fire gain to achieve their directivity and hence are quite large. Typical installations exceed 300 meters in length and require large investments in land.

Log-periodic antennas have long been desired for their wide band characteristics, efficient land use, and modest price. Until recently, increasing the gain of a log periodic has been attempted through end-fire techniques. This approach results in very large structures, which are difficult to support and install.

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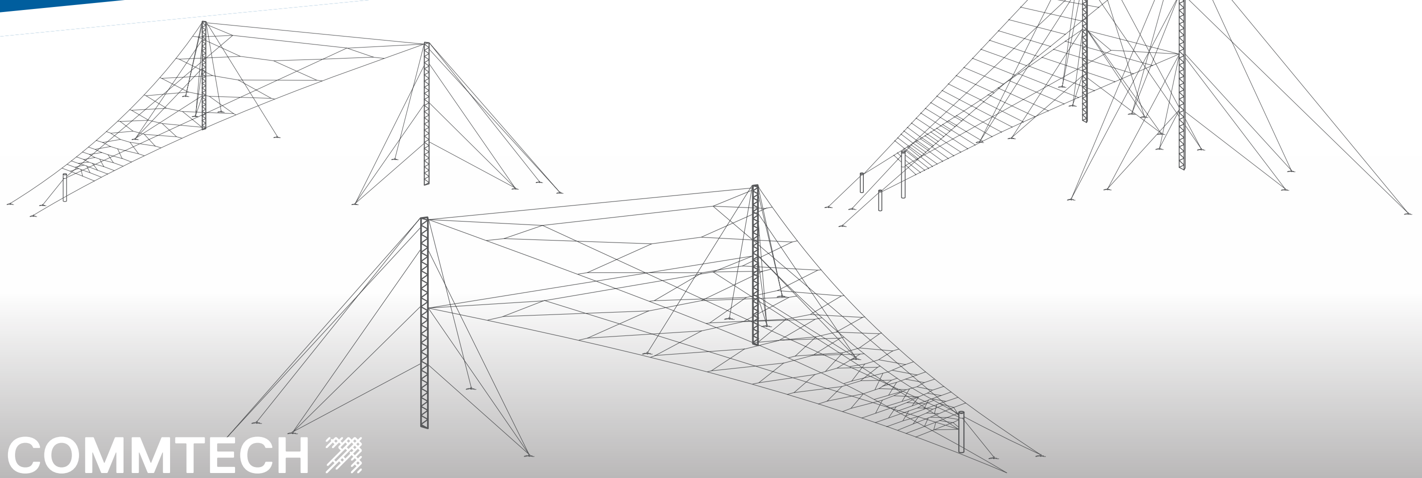
Small structures with very high gain are now possible using techniques developed at TCI employing broadside gain. Use of the clamped mode technique physically increases the width of the radiating aperture, resulting in larger broadside gain. The width of the active region of the Model 524 and 527/527B is 1.5 wavelengths.

Individual radiators resemble a saw-tooth and are the electrical equivalent of “fattened” radiators with low Q. The reduction in Q increases the power handling capability and lengthens the effective active region, resulting in greater radiation efficiency.

KEY FEATURES

- Reliable communications on long-range circuits
- High power gain — over 18 dBi
- Wide frequency bandwidth — 4 to 30 MHz
- Small land area — replaces rhombic twice the size
- Low take-off angle



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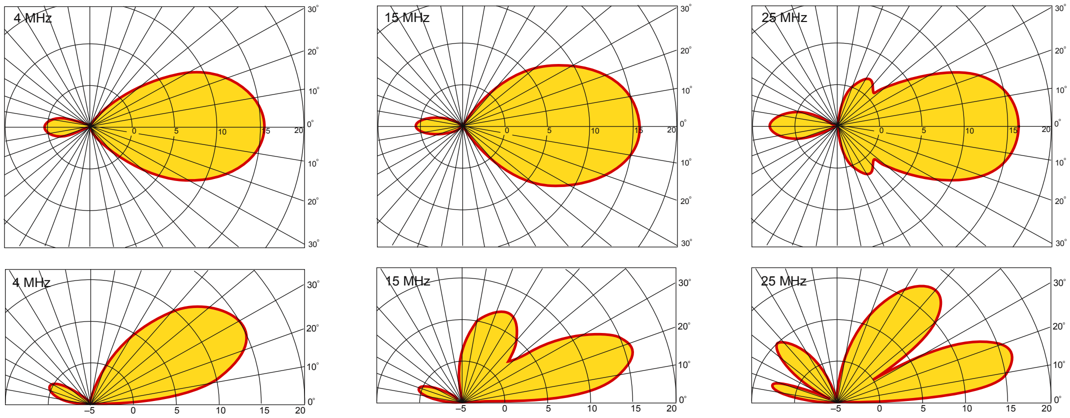
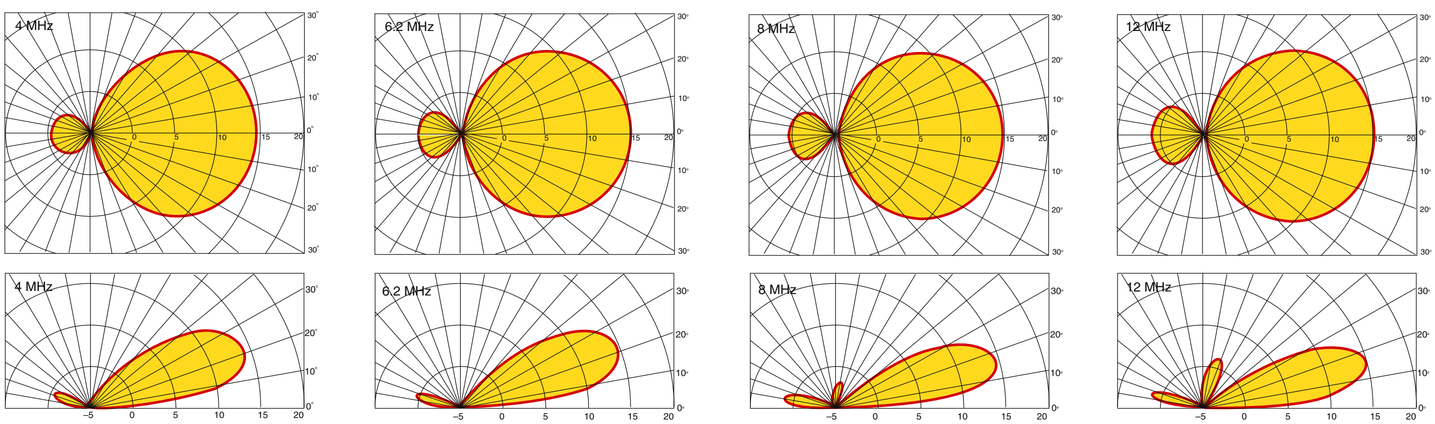
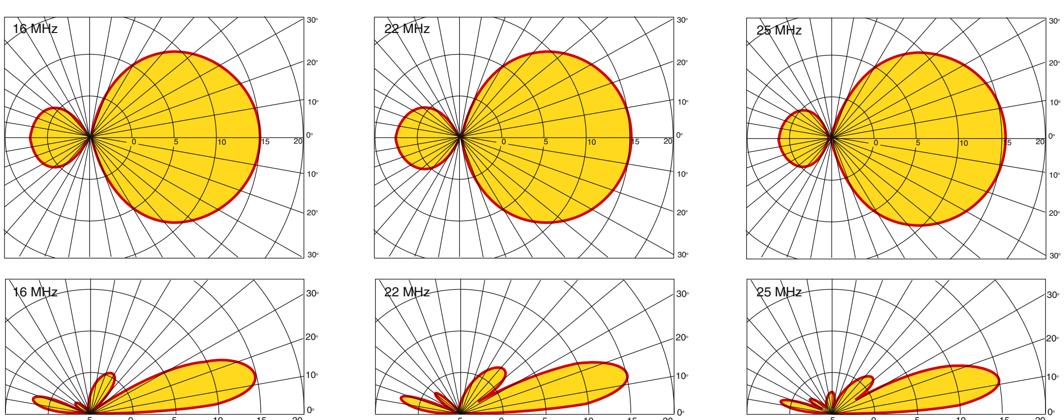
> Model 524 Antenna Azimuth and Elevation Patterns
(Azimuth pattern at elevation angle of beam maximum, gain in dBi)



NOTE: Front support poles, normally class 2, 3, or 4 Douglas Fir, are required but not supplied by TCI. Check with TCI for specific requirements.

> Model 527B Antenna Azimuth and Elevation Patterns
(Azimuth pattern at elevation angle of beam maximum, gain in dBi)





NOTE: Front support poles, normally class 2, 3, or 4 Douglas Fir, are required but not supplied by TCI. Check with TCI for specific requirements.

Model 524 Antenna

The Model 524 is a single-curtain antenna three half-wavelengths wide, resulting in a dramatic increase in the broadside radiating aperture. The antenna gain is 15.5 dBi minimum, 16 dBi nominal and the azimuth beamwidth is 38°. On a long point-to-point circuit where wide azimuth coverage is not required, this antenna provides reliable communications with a single antenna curtain.

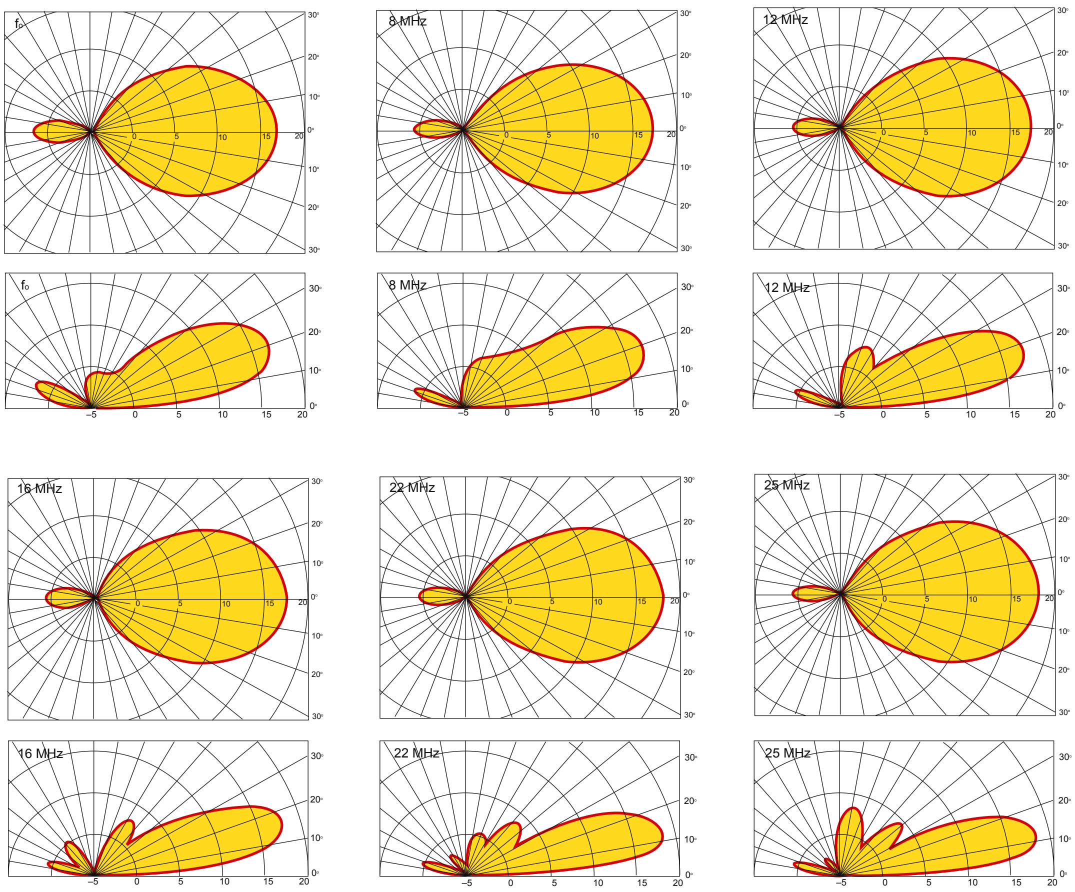
Model 527B Antenna

The 527B consists of two standard transposed dipole arrays, which are horizontally polarized and stacked in the vertical plane. The increase in vertical aperture decreases the H-plane beamwidth, resulting in antenna gain of 15 dBi while retaining an azimuth beamwidth of 64°. This antenna is extremely useful in applications where high gain, low take-off angles are required over a broad azimuth.

Model 527 Antenna

The 527 consists of two 524 curtains stacked vertically. On long-range, point-to-point circuits, where extremely high power gain and low take-off angle are required, the 527 will provide highly reliable communications. Performance will exceed that of a rhombic more than twice the size. The 527 provides antenna gain in excess of 18 dBi and a take-off angle of 12°.

> Model 527 Antenna Azimuth and Elevation Patterns (Azimuth pattern at elevation angle of beam maximum, gain in dBi)



Horizontal Polarization

It is well known that vertically polarized antennas experience undesirable ground losses without the use of sizable ground screens. Because the TCI super high gain antennas are horizontally polarized, ground losses are negligible and the maximum possible antenna gain is actually achieved without ground screens.

Durable Materials

All TCI antennas share the same high-quality, exhaustively tested components and materials. All radiators, feedlines, and catenaries are Alumoweld, a wire composed of a high-strength steel core and a highly conductive, corrosion-resistant, welded coating of aluminum. All feedline and radiator tip insulators are made of high-strength glazed alumina, a material with an extremely low loss tangent (.001), which is virtually impervious to the effects of ultraviolet radiation, dirt, and salt spray.

Fixed-station log-periodic antennas traditionally have used fiberglass catenary and drop rod assemblies for their excellent dielectric and tensile strength properties. However, field experience has shown that minute, difficult-to-detect flaws in the material, RF burning and small nicks incurred during installation may result in catastrophic structural failure later on. This, along with deterioration when stored for long periods of time at high temperature and humidity, indicate an opportunity for improvement. As a result, TCI antennas use Alumoweld catenaries, broken up by fail-safe insulators, which are not subject to the failure modes experienced by fiberglass.

The TCI towers employ either 6061-T6 aluminum or galvanized steel. All bolts and nuts are of the same material as the tower, thereby eliminating all dissimilar metal contacts.

Model 524 Specifications

The Model 524 is a single curtain antenna utilizing the clamped mode fattened radiator design. The antenna is three half wavelengths wide resulting in a dramatic increase in the broadside radiating aperture. The antenna gain is 15.5 dBi minimum, 16 dBi nominal and the azimuth beamwidth is 38º. On a long point-to-point circuit where wide azimuth coverage is not required this antenna provides reliable communications with a single antenna curtain.

Polarization	Horizontal
VSWR	2.0:1 maximum
Azimuth Beamwidth	38º nominal
Front-to-Back Ratio & Side Lobe Level	13 dB nominal
Environmental Performance	Designed in accordance with EIA Specification RS-222C for loading of 225 km/h (140 mi/h) wind, no ice, 145 km/h (90 mi/h) wind, 12 mm (1/2”) radial ice Optional: 160 km/h (100 mi/h) wind only, no ice

Size

Model Number	Frequency Range	Height		Length*		Width*	
		ft	m	ft	m	ft	m
524-3-N	4–30 MHz	141	42.9	406	123.8	597	182.5
524-6-N	5–30 MHz	121	36.8	358	109	514	157
524-4-N	6.2–30 MHz	101	30.8	285	86.9	395	120.4

* Measured from extreme guy points

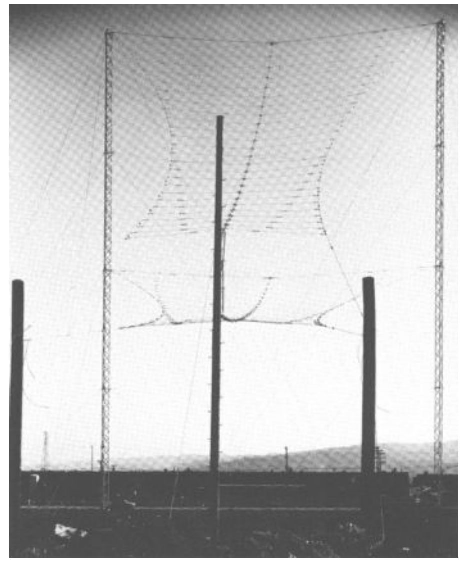
Gain and Pattern Data

Frequency	Gain	LHPP	TOA	UHPP
f_o	15.5 dBi	15º	27º	42º
15 MHz	16.0 dBi	9º	19º	29º
21 MHz	16.5 dBi	9º	17º	27º
25 MHz	16.5 dBi	8º	15º	24º
30 MHz	16.5 dBi	8º	14º	23º

Power and Impedance Data

Model Number	Input Impedance	Power (Avg./PEP)	Connector
524-N-02	50 ohm	Receive	Type N Female
524-N-03	50 ohm	10/50 kW	1-5/8” EIA Female
524-N-06	50 ohm	1/2 kW	Type N Female

Model 527B Specifications



The Model 527B antenna consists of two standard transposed dipole arrays which are horizontally polarized and stacked in the vertical plane. The increase in ver tical aperture decreases the H-plane beamwidth resulting in antenna gain of 15 dBi while retaining an azimuth beamwidth of 64º. This antenna is extremely useful in applications where high gain, low take-off angles are required over a broad azimuth.

Polarization	Horizontal
VSWR	2.0:1 maximum
Azimuth Beamwidth	64º nominal
Front-to-Back Ratio & Side Lobe Level	13 dB nominal
Environmental Performance	Designed in accordance with EIA Specification RS-222C for loading of 225 km/h (140 mi/h) wind, no ice, 145 km/h (90 mi/h) wind, 12 mm (1/2”) radial ice Optional: 160 km/h (100 mi/h) wind only, no ice

Size

Model Number	Frequency Range	Height		Length*		Width*	
		ft	m	ft	m	ft	m
527B-2-N	4–30 MHz	220	67.2	487	148.4	600	183
527B-8-N	6.2–30 MHz	151	46	330	101	410	125

* Measured from extreme guy points

Gain and Pattern Data

Frequency	Gain	LHPP	TOA	UHPP
4 MHz	14.5 dBii	11º	22º	35º
6.2 MHz	14.7 dBi	10º	20º	34º
12 MHz	15.0 dBi	8º	17º	26º
25 MHz	15.2 dBi	6º	14º	21º
30 MHz	15.2 dBi	6º	13º	20º

Power and Impedance Data

Model Number	Input Impedance	Power (Avg./PEP)	Connector
527B-N-02	50 ohm	Receive	Type N Female
527B-N-03	50 ohm	10/50 kW	1-5/8” EIA Female
527B-N-06	50 ohm	1/2 kW	Type N Female

Model 527 Specifications

The Model 527 consists of two 524 curtains stacked vertically. On long range point-to-point circuits where extremely high power gain and low take-off angle are required, the 527 will provide highly reliable communications. Performance will exceed that of a rhombic more than twice the size. The 527 provides antenna gain in excess of 18 dBi and at a take-off angle of 12º.

Polarization	Horizontal
VSWR	2.0:1 maximum
Azimuth Beamwidth	38º nominal
Front-to-Back Ratio & Side Lobe Level	13 dB nominal
Environmental Performance	Designed in accordance with EIA Specification RS-222C for loading of 225 km/h (140 mi/h) wind, no ice, 145 km/h (90 mi/h) wind, 12 mm (1/2”) radial ice Optional: 160 km/h (100 mi/h) wind only, no ice

Size

Model Number	Frequency Range	Height		Length*		Width*	
		ft	m	ft	m	ft	m
527-2-N	4–30 MHz	221	67.5	598	182.2	781	238.1
527-3-N	6.2–30 MHz	170	51.8	388	118.3	545	166
527-6-N	5.95–26.1 MHz	184	56	442	135	610	183

* Measured from extreme guy points

Gain and Pattern Data

Frequency	Gain	LHPP	TOA	UHPP
f_o	16.5 dBii	10º	20º	33º
12 MHz	17.5 dBi	9º	18º	28º
25 MHz	18.2 dBi	6º	13º	20º
30 MHz	18.2 dBi	6º	12º	19º

Power and Impedance Data

Model Number	Input Impedance	Power (Avg./PEP)	Connector
527-N-02	50 ohm	Receive	Type N Female
527-N-06	50 ohm	1/2 kW	Type N Female
527-N-28	50 ohm	5/10 kW	7/8” EIA Female
527-2-100	300 ohm Balanced	100kW AM (150kW Avg/ 400 kW Peak)	Balanced Terminals
527-6-100	300 ohm Balanced	100kW AM (150kW Avg/ 400 kW Peak)	Balanced Terminals
527-6-250	300 ohm Balanced	250kW AM (375kW Avg/ 1,000 kW Peak)	Balanced Terminals

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