

Dual-Polar MIMO Base Station Antennas



Compact, lightweight and rugged antennas



High data throughput with minimised dropout rates



Reduced loading on towers



Reduced costs for operators and installers



Dual Polar MIMO Antennas

Engineered Excellence

Chelton's team of engineers has designed this specific range of Dual-Polar (Vertical and Horizontally Polarised) MIMO Base Station antennas, as a complete series. This has ensured that there is a very high level of consistency of radiation patterns which are illustrated on the following pages.

As a system designer the benefits from the whole series of antennas designed in standard configurations are:

- Consistency of beamshape for each azimuth angle across the bands
- Consistency of beamshape across the full band within each product
- Highly consistent measured data available in various formats including iBwave for planning
- Vertical and Horizontal polarisations overly each other extremely well
- High isolation between polarisations
- Good choice of beamwidths to select optimum solution

Antennas in the Dual Polar MIMO Range

	Frequency (GHz)					
Azimuth Beamwidth	0.47 - 0.69	2.00 - 2.30	2.30 - 2.70	3.30 - 3.80	4.40 - 5.00	4.90 - 5.90
60°			✓	✓		✓
90°	✓	✓	✓	✓	✓	✓
120°			✓	✓		✓
Example Antenna						
Dimensions (mm)	1550x550x232	991x300x53	991x300x53	650x200x43	650x200x43	650x200x43

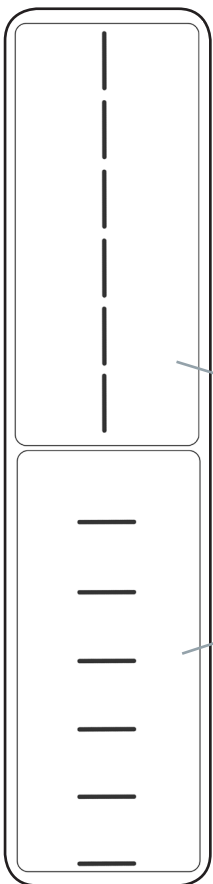
Interleaved Polarisations

Chelton Base Station Antennas

The dual-polar MIMO base station antenna range provides the vertical and horizontally (V&H) polarised elements interleaved within a single aperture. This results in very compact, lightweight, units with polarisation diversity without the need for two separate antennas.

The comparison between traditional V&H MIMO base station antennas and Chelton’s antennas containing interleaved V&H elements is shown below:

Traditional Dual-Polar MIMO Base Station Antenna

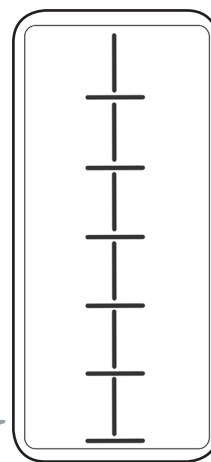


The example to the left shows the traditional MIMO base station antenna setup with separate vertically polarised and horizontally polarised antennas mounted above one another (or side-by-side) in order to provide polarization diversity.

Vertical Polarisation
Horizontal Polarisation



Chelton Dual-Polar MIMO Base Station Antenna



The example to the left shows the equivalent base station antenna solution from Chelton Ltd. This design interleaves the vertical and horizontally polarised elements within a single housing. This setup still provides the same Polarisation Diversity but results in highly efficient lightweight and compact antennas.



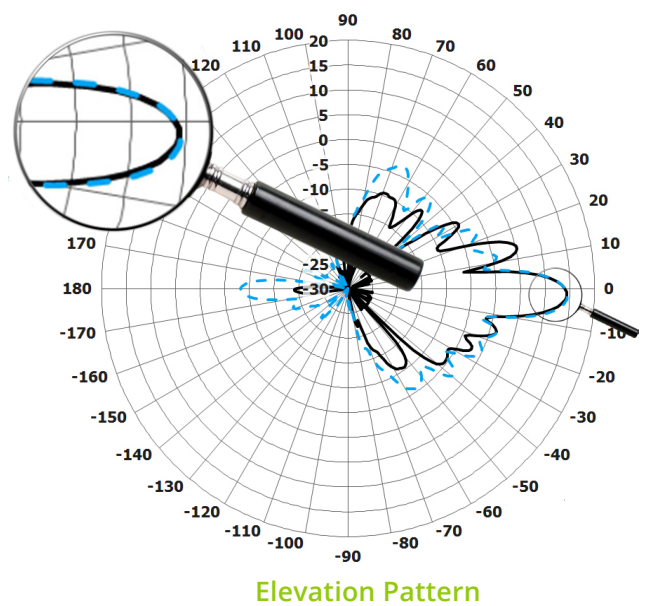
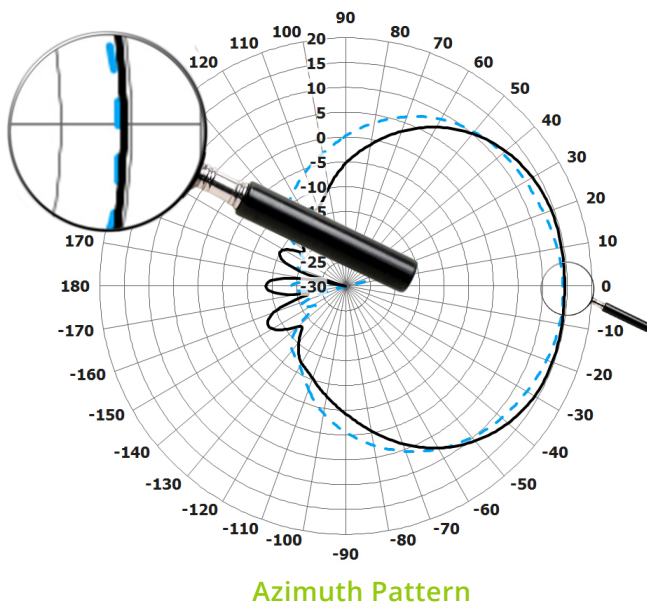
Consistency

Consistency of Patterns Within the Product Range

The radiation patterns shown on the following pages demonstrate the high level of consistency of performance across the frequency range within each antenna, from polarisation to polarisation and from band to band across the entire product range. Note that the data used to produce these plots is taken from measured patterns using the on-site anechoic test range.

The very high consistency of pattern overlay, between the two polarisations means that the two channels can be very well balanced for optimum throughput.

The plots below show the overlaid azimuth and elevation patterns for the vertical and horizontal elements of model SA15-90-2.5VH/9224 which is a 90° beamwidth antenna.

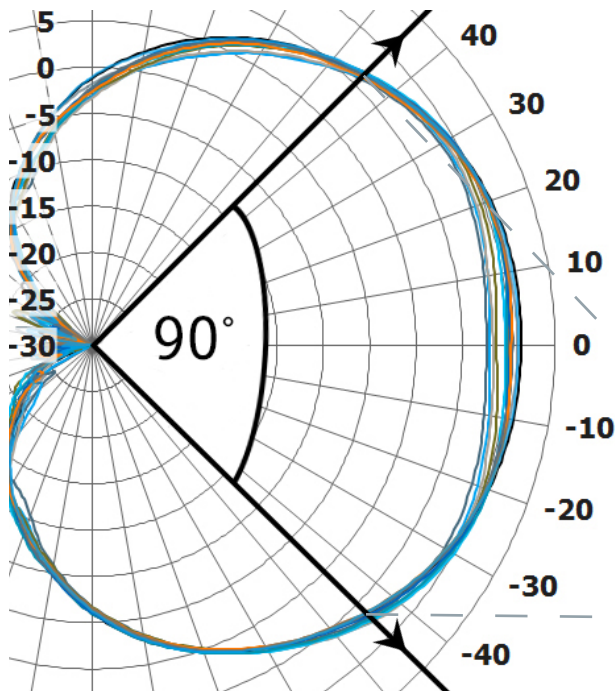


Key

- Vertical Polarisation
- Horizontal Polarisation

The combination of electrical downtilt (peak gain at 2° below the horizon) and null-fill makes this range of antennas perfect for built-up or congested areas.

Consistency of Beamwidth within its Band for a Single Antenna



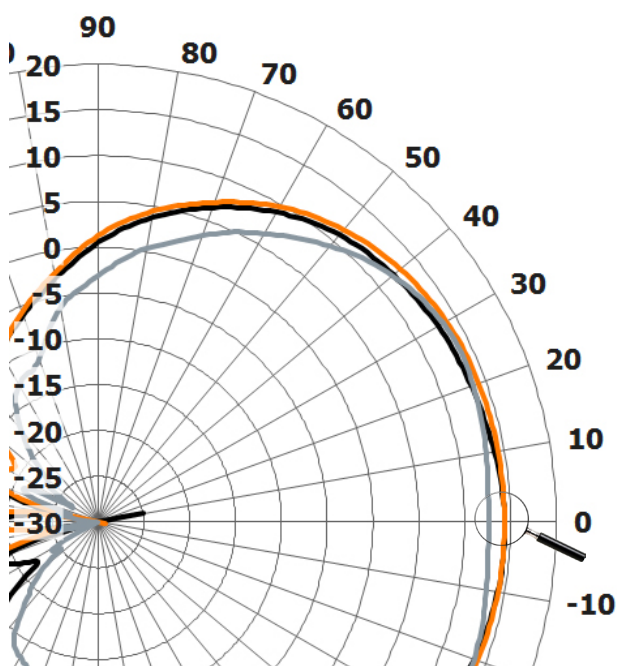
The plot to the left shows the consistency of the azimuth radiation patterns of a 90° sector antenna at 100MHz intervals, across the frequency range 4.9-5.9GHz.

Such consistency allows operators to plan systems and install equipment ahead of knowing the customer's final frequency allocation.

Measured data from model SA16-90- 5.4VH/9521.

For this 90° sector antenna the gain at +/-45° azimuth angles is within +/-1dB across the entire 4.9-5.9GHz band.

Consistency of Beam shape Across the Product Range






The plot to the left shows the consistency of the azimuth radiation patterns for the 2GHz, 3GHz and 5GHz bands for 90° sector antennas.

Such high consistency helps the operator design a system roll-out even if the frequency is likely to change during the planning process.

Measured data at centre frequencies from models SA15-90-2.5VH/9224, SA15-90-3.5VH/9344, SA16-90- 5.4VH/9521.



Key	
	2.5GHz
	3.5GHz
	5.5GHz

Technical Benefits

Custom Development

Chelton specialise in tackling the challenges posed by harsh environments, exacting requirements and niche antenna specifications.

The in-house engineering team is able to understand, analyse and create solutions to these challenges.

Example customisation options can include:

- Mounting plates and points for radios and other units
- Integral GPS antenna
- Optional tower mounting kits
- 4x4 MIMO configurations

The image to the right shows a dual-polar base station antenna located in an oil field. The antenna was custom developed by Chelton to mount directly to the customer's own radio. It also shows the versatility of the MK13 adjustable mounting kit, which was developed specifically for this antenna.



Image Courtesy of Redline Communications

Mounting Kits

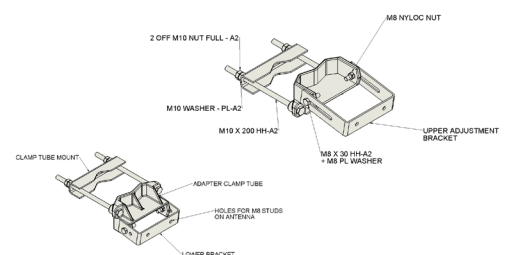
The task of installing antennas in the dual-polar MIMO base station range has been made as efficient as possible with the MK13 adjustable mounting kit.

A range of other mounting kits are also available to meet specific customer requirements.

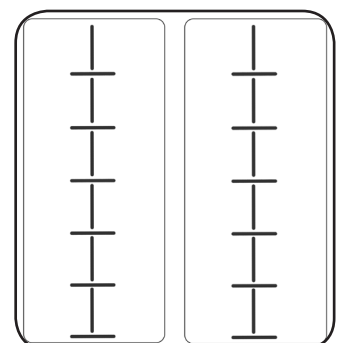
4x4 MIMO Configurations

Chelton's dual-polar antennas can be combined within a single housing to produce a 4x4 MIMO system which dramatically reduces the overall size of the antenna configuration without compromising the system performance.

The diagram to the right shows a basic configuration example for a 4x4 MIMO antenna from Chelton Ltd, with two sets of interleaved elements.



MK13 Adjustable Mounting Kit



Example 4x4 MIMO Configuration

Dual-Polar Base Station MIMO Antenna Product Range

The antennas listed below make up the standard dual-polar base station MIMO range available from Chelton. If the antenna you need is not included please contact us to discuss your requirements.

Antennas, UHF

SECTOR

Part Number	Frequency GHz	Gain dBi	Beamwidth °		Polarisation	Power Rating	Connector
			Az	El			
SA11-90-0.6VH/2178	0.47 - 0.69	11	9	20	Dual V&H	100W	N(F) x2

Antennas, 2GHz - 3GHz

SECTOR

Part Number	Frequency GHz	Gain dBi	Beamwidth °		Polarisation	Power Rating	Connector
			Az	El			
SA16-90-2.2VH/9227	2.00 - 2.30	15	90	9	Dual V+H	50W	N(F) x2
SA16-60-2.5VH/9223	2.30 - 2.70	16	60	9	Dual V+H	50W	N(F) x2
SA15-90-2.5VH/9224	2.30 - 2.70	15	90	9	Dual V+H	50W	N(F) x2
SA14-120-2.5VH/9225	2.30 - 2.70	14	120	9	Dual V+H	50W	N(F) x2

Antennas, 3GHz - 4GHz

SECTOR

Part Number	Frequency GHz	Gain dBi	Beamwidth °		Polarisation	Power Rating	Connector
			Az	El			
SA16-60-3.5VH/9343	3.30 - 3.80	16	60	8.5	Dual V&H	50W	N(F) x2
SA15-90-3.5VH/9344	3.30 - 3.80	15	90	8.5	Dual V&H	50W	N(F) x2
SA14-120-3.5VH/9345	3.30 - 3.80	14	120	8.5	Dual V&H	50W	N(F) x2

Antennas, 4GHz - 6GHz

SECTOR

Part Number	Frequency GHz	Gain dBi	Beamwidth °		Polarisation	Power Rating	Connector
			Az	El			
SA16-90-4.7VH/2174	4.40 - 5.00	16	90	6	Dual V&H	50W	N(F) x 2
SA17-60-5.4VH/9520	4.90 - 5.90	17	60	6	Dual V&H	50W	N(F) x2
SA16-90-5.4VH/9521	4.90 - 5.90	16	90	6	Dual V&H	50W	N(F) x2
SA15-120-5.4VH/9522	4.90 - 5.90	15	120	6	Dual V&H	50W	N(F) x2

Physical Specifications					
Frequency Band	Standard Finish	Mass Kg/lbs	Temperature Rating °C	Wind Loading @160 Kph /	Dimensions mm
UHF	White	17.5 Kgs / 38.6 lbs	-40 to +60	138 Kgs / 304 lbs	1550 x 550 x 232
2.00 - 3.00 GHz	White	4.8 Kgs / 10.6 lbs	-40 to +60	48.2 Kgs / 106 lbs	991 x 300 x 53
3.00 - 4.00 GHz	White	1.5 Kgs / 3.3 lbs	-40 to +60	21 Kgs / 46 lbs	650 x 200 x 43
4.00 - 6.00 GHz	White	1.5 Kgs / 3.3 lbs	-40 to +60	21 Kgs / 46 lbs	650 x 200 x 43

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