TRIMBLE GNSS GEODETIC ANTENNAS

A SOLUTION FOR EVERY APPLICATION

THE CHOICE IS YOURS. TRIMBLE PROVIDES THREE GNSS ANTENNAS FOR GEODETIC APPLICATIONS. BOTH SOLUTIONS DELIVER LONG TERM PERFORMANCE WITH PROVEN ACCURACY AND RELIABILITY. NO MATTER WHAT YOUR NEEDS ARE, TRIMBLE HAS AN ANTENNA THAT WILL WORK FOR YOU.

Specifications	Trimble Zephyr Geodetic 2 GNSS Antenna	Trimble GNSS-Ti Choke Ring Antenna	Trimble GNSS Choke Ring Antenna
Minimum tracking elevation	0 Degrees	0 Degrees	0 Degrees
Practical tracking elevation	<3 Degrees	<5 Degrees	<5 Degrees
Supported positioning signal bands	L1/L2/L5/G1/G2/G3/E1/E2/ E5ab/E6/Compass	L1/L2/L5/G1/G2/G3/E1/E2/ E5ab/E6/Compass	L1/L2/L5/G1/G2/G3/E1/E2/ E5ab/E6/Compass
Supported SBAS signal bands	WAAS, EGNOS, QZSS, Gagan, MSAS, OmniStar	WAAS, EGNOS, QZSS, Gagan, MSAS, OmniStar	WAAS, EGNOS, QZSS, Gagan, MSAS, OmniStar
Phase-center accuracy	2 mm or better	2 mm or better	2 mm or better
Phase-center repeatability	<1 mm	<1 mm	<1 mm
Maximum phase-center eccentricity	2 mm	2 mm	2 mm
Antenna gain	50 dB ±2dB	50 dB ±2dB	50 dB ±2dB
LNA features	Advanced filtering to reduce interference by high power out-of-band transmitters	Advanced filtering to reduce interference by high power out-of-band transmitters	Advanced filtering to reduce interference by high power out-of-band transmitters
LNA signal margin	13 dB	13 dB	13 dB
Supply voltage	3.5 V DC to 20 V DC	3.5 V DC to 20 V DC	3.5 V DC to 20 V DC
Supply current (maximum)	125 mA	125 mA	125 mA
Power consumption (maximum)	440 mW	440 mW	440 mW
Dimensions	34.3 cm diameter x 7.6 cm height 13.5 in diameter x 3 in height	38 cm diameter x 14.6 cm height 15 in diameter x 5.75 in height	38 cm diameter x 14 cm height 15 in diameter x 5.5 in height
Weight	1.36 kg (3 lb)	4.3 kg (9.5 lb)	4.3 kg (9.5 lb)
Element type	Dual four-point-feed patch	Dual four-point-feed patch	Phase-ripple-tested Dorne & Margolin AIL C-146
Polarization	Enhanced right-hand circular	Enhanced right-hand circular	Right-hand circular
Axial ratio	2 dB at Zenith	2 dB at Zenith	2 dB at Zenith
Voltage Standing Wave Ratio	2.0 maximum	2.0 maximum	2.0 maximum
Left-hand circular polarization (LHCP)	20 dB minimum	20 dB minimum	20 dB minimum
RoHS compliant	Yes	No	No
Multipath mitigation technologies	LHCP rejection and resistive ground plane	LHCP rejection and 1/4 wave choke ring ground plane	LHCP rejection and 1/4 wave choke ring ground plane
Ground plane design	Trimble Stealth resistive	JPL designed 1/4 wave choke ring	JPL designed 1/4 wave choke ring
Coaxial connector	TNC Female	N Female	N Female
External radome	46291-00 available	59314 available/recommended	59314 available/recommended
Shock rating	2 m (6.56 ft) drop	1 m (3.28 ft) drop	1 m (3.28 ft) drop
Vibration rating	MIL-STD-810-F on each axis	4.3 GRMS, random vibration profile; Z axis only	4.3 GRMS, random vibration profile; Z axis only
Humidity	100% humidity proof, fully sealed	100% humidity proof, fully sealed	100% humidity proof, fully sealed
Temperature **Operating** **Storage**	 –55 °C to +85 °C (–67 °F to 185 °F) –55 °C to +85 °C (–67 °F to 185 °F)	 –55 °C to +85 °C (–67 °F to 185 °F) –55 °C to +85 °C (–67 °F to 185 °F)	 –55 °C to +85 °C (–67 °F to 185 °F) –55 °C to +85 °C (–67 °F to 185 °F)
Mounting thread	5/8"–11 Female	5/8"–11 Female	5/8"–11 Female

TRIMBLE GEODETIC ANTENNAS MITIGATE MULTIPATH IN DIFFERENT WAYS. EACH ANTENNA PROVIDES THE ACCURACY AND PERFORMANCE REQUIRED FOR THE MOST RIGOROUS APPLICATIONS.

TRIMBLE GNSS GEODETIC ANTENNAS—NOW YOU HAVE A CHOICE

THREE PROVEN ANTENNAS TO ACHIEVE GEODETIC ACCURACY AND LONG-TERM PERFORMANCE

Critical to the value of any GNSS network are the antennas that keep constant watch on GNSS satellite signals. Trimble geodetic antennas provide network operators with the assurance of long-term operation and unsurpassed performance.

Trimble offers three styles of antennas designed for geodetic applications—the Trimble Zephyr Geodetic 2 Antenna, the Trimble GNSS-Ti Choke Ring Antenna and the Trimble GNSS Choke Ring Antenna. Each option is proven to deliver the exacting performance that network operators demand to ensure long-term success. In addition, three unique antenna designs provide the flexibility to reach a wide range of operational goals.

SETTING THE GEODETIC STANDARD

All Trimble GNSS geodetic antennas conform to strict standards of consistency and performance to deliver the best possible low elevation tracking.

Trimble geodetic antennas meet or exceed phase-center eccentricity standards of 2 mm, and offer industry-leading multipath mitigation. Trimble's geodetic-quality antennas maximize positioning performance and consistency through tightly-controlled manufacturing practices, extensive testing and innovative engineering.

Trimble GNSS Choke Ring Antenna

Trimble Zephyr Geodetic 2 Antenna

TRIMBLE GNSS GEODETIC ANTENNAS

TRIMBLE GNSS CHOKE RING ANTENNAS

Originally conceived in the mid 1980s, the choke ring's ground plane has been widely adopted by the scientific community. The Trimble GNSS choke ring ground plane uses the Jet Propulsion Labs (JPL) design, which is considered the standard of scientific geodetic antenna ground planes. In addition to updating the electronics to improve low-noise amplification and GNSS tracking, Trimble has modernized the GNSS choke ring antenna so that it can track all existing and proposed public GNSS constellations. These include GPS, GLONASS, Galileo and Compass.

The Trimble GNSS-Ti Choke Ring antenna offers the benefits of the JPL-designed choke ring ground plane with proven Trimble antenna element technology. Built on the technology of the Trimble Zephyr Geodetic 2 element, this antenna has a proven track record of exceeding high accuracy performance specifications in some of the most demanding environments on Earth.

The Trimble GNSS Choke Ring antenna includes a Trimble-exclusive Dorne & Margolin quad-dipole element. A standard by which all other geodetic antennas are judged, the D & M element serves as the control in published relative antenna models. The design is also proven to offer excellent long term stability.

To ensure the best possible performance, Trimble requires that the element manufacturer conduct supplemental performance testing and provide proof of passing on all Trimble GNSS Choke Ring antenna elements. As a final step to guarantee geodetic performance, all assembled choke ring antennas undergo additional Trimble-exclusive precision rotation testing to verify a phase-center eccentricity of no more than 2 mm. Every Trimble GNSS Choke Ring antenna comes with a certificate displaying the rotation test results specific to that antenna.

TRIMBLE ZEPHYR GEODETIC 2 ANTENNA

In the years following the launch of the choke ring antenna, Trimble developed an alternative means to achieving geodetic-quality results. Design goals included increasing accuracy and eliminating the frequency-dependent ground plane design. First produced in 2001, the GPS-capable Trimble Zephyr Geodetic antenna is the high-performance result of these efforts.

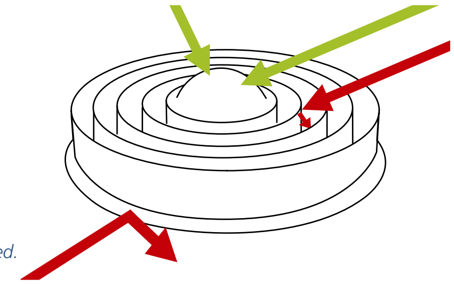
Then, in 2006, Trimble released the next generation with the GNSS-capable Zephyr Geodetic 2 antenna. Consistently delivering phase-center eccentricities of less than 1 mm, the Zephyr Geodetic 2 antenna's performance guarantees that even in a large network, all stations will be capable of delivering accurate, repeatable measurements. This is not the only advanced feature of the Trimble Zephyr Geodetic 2 antenna—it also offers the unique Trimble Stealth™ ground plane. This resistive ground plane consumes unwanted signals before they can reach the receiving element and corrupt measurements. This modern, high-technology approach to multipath mitigation is more compact than the original choke ring design and allows for the use of an integrated, low-profile radome over the entire antenna element and ground plane assembly. The Trimble Zephyr Geodetic 2 antenna's design reduces wind loading and antenna weight so that a lighter mounting structure can offer geodetic-quality results while minimizing environmental impact.

Yet another benefit of the Stealth ground plane is its frequency-independent performance. It mitigates unwanted signals throughout the rapidly-expanding GNSS spectrum. The Trimble Zephyr Geodetic 2 antenna is designed to receive all existing and proposed public GNSS signals, including GPS, GLONASS, Galileo and Compass. In addition, these antennas are used in the highest-accuracy IGS reference frame networks where only the best possible long-term performance is accepted.

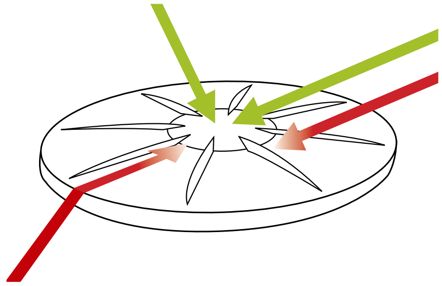
GROUND PLANES AND MULTIPATH SIGNALS

- Signals striking at shallow angles attempt to create surface waves
- Signals from below the horizon must be eliminated

Desirable signals are shown in green; undesirable signals are shown in red.



1) Choke Ring weakens multipath signals



2) Zephyr Geodetic 2 consumes multipath signals

MANAGING MULTIPATH

The extended ground plane of a geodetic antenna is intended to stop all multipath signals that come from near or below the horizon. These unwanted signals often reflect off of more than one surface and many have right-hand circular polarization (RHCP) characteristics that the antenna will readily accept. With a conventional metal disk ground plane, unwanted signals can actually strike the top of the ground plane, or its edge, at a shallow angle.

Those signals then propagate along the surface of the plane and are easily conducted directly into the receiving element. This is called a surface wave. An effective geodetic ground plane must block below-horizon signals from entering the element while also prohibiting surface waves.

Trimble's JPL-designed choke ring and Stealth ground planes both accomplish these tasks, but in very different ways. The choke ring antenna reflects signals that come from below. For signals that would otherwise be captured as surface waves, the choke ring draws these signals into the choke channels where they repeatedly reflect and encounter other reflected signals until they lose all energy or are reflected away from the receiving element.

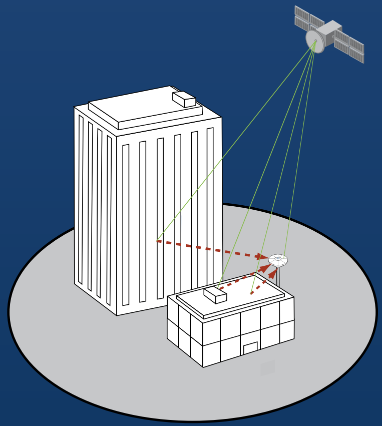
The Trimble Stealth ground plane uses electrical resistance rather than frequency-tuned rings to keep unwanted signals from reaching the antenna element. With its resistive ground plane, signals that strike the plane from any direction are drawn into the Stealth plane. Here, they encounter increasing electrical resistance, which rapidly converts their radio energy into tiny amounts of harmless heat. The signals lose all energy before they can reach the element and cause interference.

WHICH ANTENNA IS RIGHT FOR YOU?

The choice of what kind of antenna you ultimately choose is driven by your operational needs. Depending upon your priorities, it may become clear that one antenna style is a better fit for your particular application. For example, are you running a network or performing a geodetic campaign? Does an external organization dictate the antenna style that you must use? Are size and weight important considerations for installation or long-term deployment? Although there are many different factors to consider and evaluate before making this important decision, Trimble has a solution that will meet your precise needs.

PROPER ANTENNA PLACEMENT

Geodetic antennas are designed to provide accurate measurements even in imperfect conditions, but this does not mean that a geodetic antenna will give peak performance no matter where it is deployed. Therefore, selecting the best possible location for a reference antenna is very important because the measurements will be relied upon for many years.



The following are very basic requirements for an antenna installation. Note that some governing bodies require significant additional features in an antenna monument and its location.

- The antenna mount must be stable in changing weather conditions and temperatures. By definition, a reference antenna should not move.
- The antenna sky view should be clear to the horizon within a 100 m radius to reduce multipath signal interference.
- The antenna should be a minimum of 1.5 m above nearby signal reflectors to reduce multipath signal interference.
- There should not be any high-power transmitting antennas within 300 m to prevent RF interference.

www.trimble.com

NORTH AMERICA
Trimble Engineering & Construction Group
10355 Westmoor Drive, Suite 100
Westminster, Colorado 80021
USA
800-480-0510 (Toll Free)
+1 720-887-6100 Phone
+1 720-887-6101 Fax

EUROPE
Trimble Germany GmbH
Am Prime Parc 11
65479 Raunheim
GERMANY
+49-6142-2100-0 Phone
+49-6142-2100-550 Fax

ASIA-PACIFIC
Trimble Navigation Singapore PTE Limited
80 Marine Parade Road
#22-06, Parkway Parade
Singapore 449269
SINGAPORE
+65-6348-2212 Phone
+65-6348-2232 Fax