



Teledyne Geospatial



6,500 m AGL
2,000,000 shots/second

Galaxy T2000 Airborne Lidar Terrain Mapper

Maximum productivity for wide-area, mountain, urban and corridor survey applications

The new ALTM Galaxy T2000 is the ultimate wide-area lidar sensor, with best-of-class density performance and collection efficiency, delivering the highest quality data sets to meet rigorous USGS lidar standards. Now with a 6500 m AGL collection envelope and 2-MHz "on-ground" collection rate, Galaxy is quite simply the highest-performance sensor on the market in the smallest form factor for maximum application and platform flexibility.

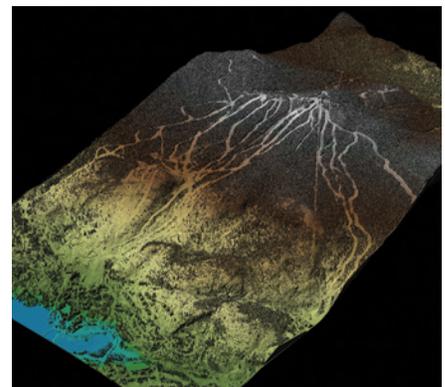
Whether gyro-stabilized or fixed-mounted, high-altitude or low, one camera or six, one Galaxy or two, the Galaxy T2000 excels in all application areas with unmatched configuration flexibility, while providing the highest data precision and accuracy available.



APPLICATIONS

- » Wide-area mapping
- » Urban mapping
- » Natural resource management
- » Engineering & infrastructure modeling
- » Powerline & transportation corridor

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Continuous Operating Envelope



Increased Vertical Density



Seamlessly Integrated Cameras

What is the secret to Galaxy's performance advantage?

POWERED BY

PulseTRAK™

POWERED BY

SwathTRAK™



Galaxy T2000 includes an innovative set of lidar technology enhancements that significantly increases sensor performance and collection efficiency, improves data quality, and greatly simplifies the collection process.

THESE NEW ENHANCEMENTS INCLUDE:

1. Continuous Operating Envelope

PulseTRAK™ technology enables a truly continuous operating envelope by eliminating the data coverage gaps and irregular point density commonly found with other multipulse-equipped sensors. This feature greatly simplifies mission planning and produces consistent data distribution throughout the entire dataset, even across receiver "blind" zones.

- » Enables consistent point density with no more receiver "blind" zones.
- » Complete collection freedom irrespective of terrain variability significantly enhances efficiency.
- » Greatly simplifies mission planning.

2. Dynamic Field of View (FOV)

Galaxy, with SwathTRAK™ technology, is the only sensor to incorporate a real-time dynamic FOV that maintains fixed-width swaths, even in varying terrain heights.

- » Maintains regular point distribution and improves point density consistency despite changes in terrain height.
- » Fewer number of flightlines, compared to fixed-FOV sensors, for maximum collection efficiency.
- » 40-70% collection cost savings, depending on terrain variability, over fixed-FOV sensor designs.

3. Real-time Sensor Protocol

Galaxy incorporates a real-time sensor protocol to enable in-air target observation and collection monitoring, significantly increasing collection confidence.

- » Real-time XYZi point display enables true-coverage verification over the entire operating envelope, even across multipulse transition zones.
- » In-air target detection and monitoring confirms detection of small targets such as powerlines in real-time.
- » Real-time LAS file generation produces immediate data deliverables.

4. High-Performance Scanner

A new, high-performance galvanometric scanner forms the foundation of Galaxy's exceptional performance capability. Featuring extremely high torque and minimal electrical inductance, the new scanner provides superior scan speeds at reduced voltages for a significant boost in performance, reliability, and scan linearity, enhancing data quality and point distribution. Improved scanner stability produces maximum calibration consistency.

- » Improves XY point distribution at higher PRF sample rates.
- » Enables faster aircraft velocities and wider scan FOVs, as well as dramatic increases in point density at lesser FOVs.
- » Includes built-in roll compensation for clean, straight data swaths over ground.



FIND OUT MORE about Optech Galaxy
www.teledyneoptech.com/galaxy

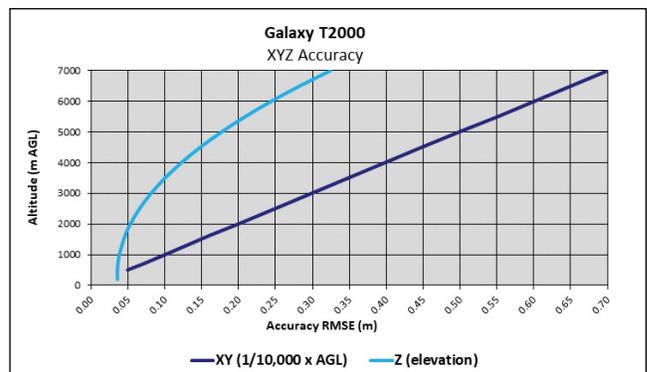
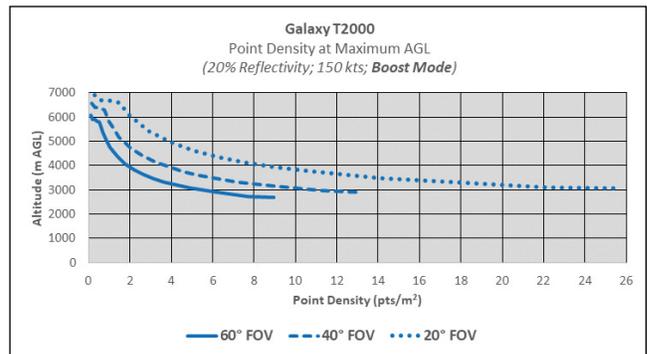
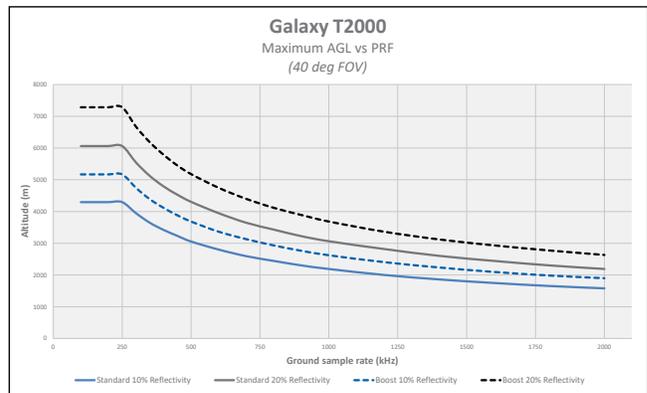
Galaxy T2000 Advantage

- » 2-MHz “on-ground” collection rate enables unprecedented point density.
- » Large performance envelope ensures collection confidence in both flat and rugged terrain types.
- » PulseTRAK™ technology enables a continuous operating envelope that can accommodate high-relief terrain with no data gaps or loss of density across multipulse transition zones.
- » SwathTRAK™ technology can reduce operating costs by as much as 70% by maintaining fixed-width flightlines for consistent point density and fewer flightlines in variable terrain.
- » Innovative “Boost Mode” feature increases range performance by as much as 20% when maximum range performance is desired.
- » Capable of up to 8 returns per emitted pulse, Galaxy guarantees the highest vertical density possible without the processing and storage burden of voluminous waveform capture (full waveform capture optionally available).
- » Unique real-time sensor protocol enables in-air point cloud display for true-coverage verification and immediate rapid-response deliverables in LAS format.
- » Optech Flight Management Suite provides integrated planning (with immersive 3D capabilities), navigation, and simultaneous control and monitoring for up to 8 sensors.
- » Industry-leading raw data precision and accuracy enables survey-grade deliverables for complete USGS Lidar Base Specification compliance (QL0/QL1/QL2) and the highest quality map products possible.
- » Gyro-stabilized and multi-sensor mounts maximize collection efficiency and enable custom sensor suites tailored to your application requirements.
- » Powerful Optech LMS Lidar Mapping Suite automates sensor calibration, maximizes laser point accuracies and quantifies project-wide accuracies.

GALAXY T2000 PRODUCTIVITY EXAMPLES (FLAT TERRAIN)

Average Point Density	2 pts/m ²	8 pts/m ²	20 pts/m ²	65 pts/m ²
Flight Altitude (AGL) ^{1, 2}	8858 ft 2700 m	6562 ft 2000 m	4790 ft 1460 m	1476 ft 450 m
Ground Speed	315 kn	210 kn	115 kn	115 kn
Swath Width ³	3118 m	2309 m	1686 m	520 m
Instantaneous Coverage Rate ⁴	1455 km ² /hr	718 km ² /hr	287 km ² /hr	89 km ² /hr
Ground Measurement Rate (kHz)	1,000,000 meas./sec	2,000,000 meas./sec	2,000,000 meas./sec	2,000,000 meas./sec

1. Calculated for 20% reflective targets; 99% detection probability; boost mode
2. Assumes full footprint interception
3. 60° FOV
4. 20% side lap considered



Galaxy T2000

Technical Specifications

PARAMETER	SPECIFICATION
Sensor Performance	
Performance envelope ^{1, 2, 3, 4}	150-6500 m AGL, nominal
Absolute horizontal accuracy ^{2, 3}	1/10,000 x altitude; 1 σ
Absolute elevation accuracy ^{2, 3}	< 0.03-0.25 m RMSE from 150-6500 m AGL
Laser Configuration	
Topographic laser	1064-nm near-infrared
Laser classification	Class IV (US FDA 21 CFR 1040.10 and 1040.11; IEC/EN 60825-1)
Pulse repetition frequency (effective)	Programmable, 100-2000 kHz
Beam divergence	0.16 mrad (1/e) or 0.23 mrad (1/e ²)
Laser range precision ⁵	< 0.008 m, 1 σ
Minimum target separation distance	< 0.7 m (discrete)
Range capture	Up to 8 range measurements, including last
Intensity capture	Up to 8 intensity measurements, including last (12-bit)
Sensor Configuration	
Position and orientation system	POS AV™ AP60 (OEM); 220-channel dual frequency GNSS receiver; GNSS airborne antenna with Iridium filters; high-accuracy AIMU (Type 57); non-ITAR
Scan angle (FOV)	10-60°
Swath width	10-115% of altitude AGL
Scan frequency	Maximum 160 Hz (320 scan lines/sec)
Flight management system	Optech FMS (Airborne Mission Manager and Nav) with operator console
SwathTRAK™	Dynamic FOV for fixed-width data swaths in variable terrain
PulseTRAK™	Multipulse tracking algorithm with no density loss across PIA transition zones
Roll compensation	±5° minimum
Data storage	Removable SSD (primary); internal SSD (spare)
Power requirements	28 V; 400 W
Dimensions and weight	Sensor: 0.34 x 0.34 x 0.25 m, 27 kg — PDU: 0.42 x 0.33 x 0.10 m, 6.5 kg
Operating temperature	0 to +35°C
Optional Peripherals	
External data storage	Ruggedized, removable 2.5" SSD
Image capture	Compatible with all Optech CS-Series and most 3rd party digital metric cameras (integration kits available)
Full waveform capture	12-bit Optech IWR-3 Intelligent Waveform Recorder with removable SSD
Gyro-stabilization	SOMAG GSM4000 integration kit
Multi-sensor mounts and pods	Machined aluminum sensor mounts; single or dual Galaxy configurations + cameras Carbon-fiber sensor mounts supporting nadir and fore/aft oblique cameras Heli-pod mount options for Bell 206/407 (FAA-approved)

1. Target reflectivity $\geq 20\%$; 99% detection probability

2. Dependent on selected operational parameters; assumes nominal FOV of up to 40° in standard atmospheric conditions (i.e. 23-km visibility) and use of Optech LMS Professional software suite

3. Angle of incidence $\leq 20^\circ$

4. Target size \geq laser footprint

5. Under Teledyne Optech test conditions, 1 sigma