DATASHEET

Trimble APX-15 UAV

Version 3, Single Board GNSS-Inertial Solution

The Trimble® APX-15 UAV is a GNSS-Inertial OEM solution designed to reduce the cost and improve the efficiency of mapping from small Unmanned Aerial Vehicles (UAVs). Comprised of a small single OEM board containing a precision GNSS receiver and inertial sensor components plus post-mission Differential GNSS-Inertial office software, the Trimble APX-15 UAV eliminates the need to survey extensive Ground Control Points (GCP's), and reduces the amount of sidelap required to be flown, thus increasing the area flown per mission.

High Accuracy, Extremely Small Package

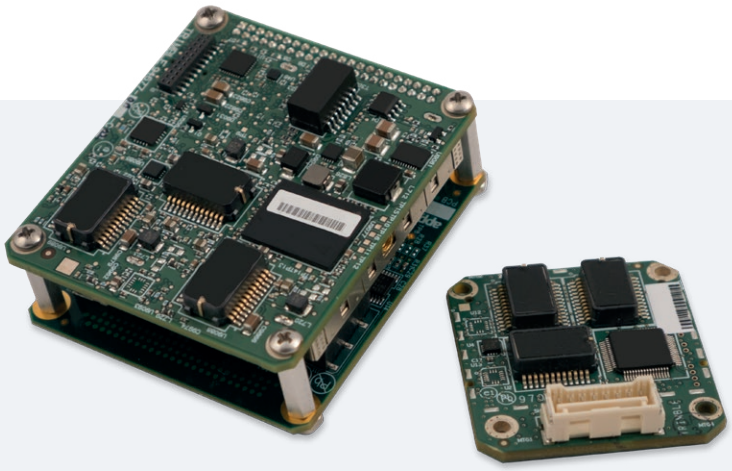
Measuring just 60 × 67 mm and weighing only 60 grams, the Trimble APX-15 UAV provides unparalleled performance in an extremely small package. And with the included Applanix® POSPac™ UAV post-mission software, it produces a highly accurate position and orientation solution for direct georeferencing of cameras, LiDARs and other UAS sensors.

The APX-15 UAV brings all the benefits of Direct Georeferencing to UAV platforms:

- Turn your UAV into a professional mapping solution
- Ultra-fast image georeferencing for faster map production and delivery
- Reduced number of ground control points, saving time and money
- Consistent, reliable, highly accurate results
- Increased collection area per flight for greater productivity
- Redundant navigation solution to autopilot for enhanced safety

Key Features

- High-performance Direct Georeferencing solution for improved efficiency and accuracy of mapping from small Unmanned Aerial Vehicles
  - Reduce/eliminate GCPs
  - Reduce sidelap
  - Accurate LiDAR/Camera georeferencing
- Compact single-board OEM module complete with survey-grade multifrequency GNSS receiver and MEMS inertial components
- Applanix IN-Fusion® GNSS-Inertial and Applanix SmartCal™ compensation technology
- POSPac UAV Differential GNSS Inertial post-processing software for highest accuracy
- RTK real-time position for precision landing applications
- Supports all common RTK corrections such as CMR, CMR+™, RTCM



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TECHNICAL SPECIFICATIONS

- Advanced Applanix IN-Fusion GNSS-Inertial integration technology
- Solid-state MEMS inertial sensors with Applanix SmartCal compensation technology
- Advanced Trimble Maxwell™ Custom GNSS survey technology
- 336 Channels
  - GPS: L1 C/A, L2C, L2E, L5
  - GLONASS: L1 C/A, L2 C/A, L3 CDMA[8]
  - BeiDou: B1, B2
  - Galileo[1]: E1, E5A, E5B, E5AltBOC
  - QZSS: L1 C/A, L1S, L1C, L2C, L5, LEX
  - SBAS: L1 C/A, L5
  - MSS L-band: Trimble RTX®, Trimble OmniSTAR®
- High precision multiple correlator for GNSS pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Proven Trimble low elevation tracking technology
- 100 Hz position, roll, pitch and heading output
- IMU data rate 200 Hz
- Navigation output format: ASCII (NMEA-0183), Binary (Trimble GSOF)
- Supported Reference input: CMR, CMR+, sCMRx, RTCM 2.1, 2.2, 2.3, 3.0, 3.1
- Support for POSPac UAV post-processing software (included)
- No export permit required

LAN INPUT/OUTPUT

ALL ETHERNET FUNCTIONS ARE SUPPORTED THROUGH DEDICATED IP ADDRESS (STATIC OR DNS) SIMULTANEOUSLY	
TCP/IP and UDP	ASCII and Binary data streaming (Time tag, PPS sync, status, position, attitude, velocity, track and speed, dynamics, performance metrics, GNSS data)
HTTP	Web based Control software (GUI) for easy system configuration and low rate display. Support for all common browsers (IE, Safari, Mozilla, Google Chrome, Firefox)

SERIAL INPUT/OUTPUT

RS232 LEVEL PORT	
TTL level (3.3 V) port Parameters	ASCII and Binary data streaming (Time tag, PPS sync, status, position, attitude, velocity, track and speed, dynamics, performance metrics, GNSS data), reference input (CMR, CMR+, sCMRx, RTCM), configuration messages, Gimabal Encoder and Autopilot input support.
OTHER I/O	
PPS (pulse-per-second)	Time Sync Pulse output
Event Input (2)	Two time mark of external events TTL 3.3 V pulses, max rate 50 Hz
Digital I/O (3)	LED drivers with dedicated functionality for systems integrators

LOGGING

Internal Logging ..... 6 GByte Flash memory
External Logging ..... USB 2.0 Device port
Parameters ..... Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (200 Hz), raw GNSS data

PERFORMANCE SPECIFICATIONS[2] (RMS ERROR)

Unmanned Airborne Vehicle Applications

AIRBORNE	SPS	RTK[4]	PP-RTX[9]	POST-PROCESSED[5]
Position (m)	1.5 - 3.0	0.02 - 0.05	0.03 - 0.06	0.02 - 0.05
Velocity (m/s)	0.05	0.02	0.015	0.015
Roll & Pitch (deg)	0.04	0.03	0.025	0.025
True Heading[3] (deg)	0.30	0.18	0.08	0.080

PHYSICAL CHARACTERISTICS

Board Set

Size ..... 67 L × 60 W × 15 H mm (nominal)
Weight ..... 60 grams
Power ..... Wide range input 9-30 V DC, typical power consumption of 3.5W at room temperature
Connectors ..... I/O: 44 Pin Header Samtec TMM-122-03-S-S-MW (mating part FCI 90311-044LF)
Antenna Port ..... Connector: MMCX receptacle
Output Voltage: 3.3 V DC to 5 V DC
Maximum Current: 400 mA
Minimum Input Signal Strength: 32 dB (>35 dB Recommended)

ENVIRONMENTAL CHARACTERISTICS

Temperature ..... -40 °C to +75 °C (Operational)
-55 °C to +85 °C (Storage)
Measurement Range ..... +/- 6g[6], +/- 300 dps
Mechanical Shock ..... +/- 75g Survival
Operating Humidity ..... 5% to 95% R.H. non-condensing at +60 °C
Maximum Operating Limits ..... 515 m/sec
18,000 m

ADDITIONAL ACCESSORIES[7]

- Evaluation Kit (Development Board)

POSPAC UAV OFFICE SOFTWARE

- Post-processed Differential GNSS-Inertial SW for APX-15
- 200 Hz Navigation solution (Position, Velocity, Orientation, Rates, Accelerations)
- Applanix IN-Fusion GNSS-Integration technology
- Full support for UAV dynamic models
- Single Base Differential GNSS-Inertial processing
- Forward and reverse processing with optimal Smoother
- Support for Applanix SmartBase™ virtual reference station module[7]
- Support for PP-RTX[9]

1 Developed under a License of the European Union and the European Space Agency
2 Typical performance. Actual results are dependent upon satellite configuration, atmospheric conditions and other environmental effects
3 Typical survey mission profile, max RMS error. Heading error will increase for low speed rotor applications and when hovering.
4 Requires base station and radio link, sold separately
5 POSPac UAV, short base line operation
6 Sensor bandwidth (-3 dB amplitude) ~ 50 Hz
7 Sold separately
8 There is no official GLONASS L3CDMA or Galileo E6 ICD. The current tracking capability is based on publicly available information. Full receiver compatibility cannot be guaranteed.
9 POSPac UAV/MMS, Post-processed Trimble CenterPoint® RTX, typical mission performance subscription sold separately. The accuracy is subject to quality of GNSS, durational data set, and regional coverage.

Specifications subject to change without notice.

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