



# Trimble AP60

## EMBEDDED GNSS-INERTIAL SYSTEMS FOR CONTINUOUS MOBILE POSITIONING AND DIRECT GEOREFERENCING APPLICATIONS

The Trimble AP60 GNSS-Inertial System is an embedded GNSS-Inertial OEM board set plus Inertial Measurement Unit (IMU) in a compact form factor. It is designed to give system integrators the ability to harness the best in GNSS multi-frequency positioning technology, with the superior capabilities of inertial data for continuous mobile positioning in poor signal environments, and for the orientation of imaging sensors.

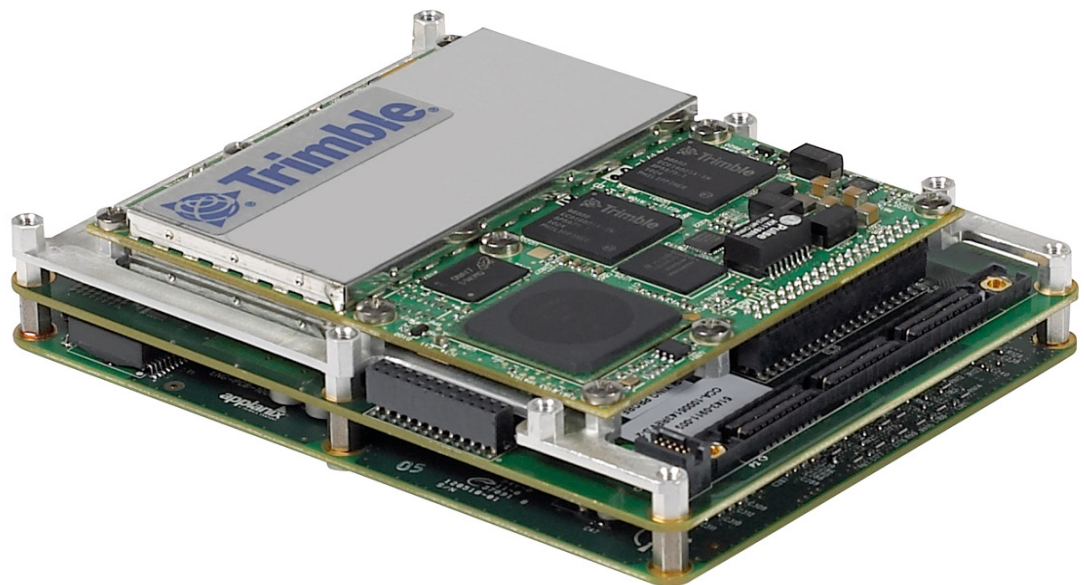
The Trimble AP60 features a high-performance precision GNSS receiver and the industry leading Applanix IN-Fusion™ GNSS-Inertial integration technology running on a powerful, dedicated Inertial Engine (IE) board. This flexible, modular design ensures the ability to perform full high-powered GNSS-inertial processing without sacrificing performance, and an upgrade path to next generation GNSS boards as they become available.

### PERFORMANCE YOU CAN TRUST

Whether it be guiding autonomous vehicles to winning finishes in the DARPA Urban challenge, motion compensating multibeam sonar to meet IHO standards, or georeferencing airborne laser scanners to centimetre level accuracy from high in the sky, Trimble GNSS with Applanix inertial technology has a proven track record of performance without compromise. With Trimble AP products you know exactly what positioning performance you will get for your mobile application.

### Key Features

- ▶ Proven GNSS-Aided Inertial technology from Trimble Applanix
- ▶ Centimeter level mobile positioning accuracy
- ▶ Industry leading continuous positioning performance in GNSS denied environments
- ▶ Full position and orientation solution for direct georeferencing of remote sensing systems
- ▶ Fully supported for all dynamic environments: terrestrial, airborne and marine



## INERTIAL MEASUREMENT UNIT (IMU)

Type	Class	Temperature (c)	Power	Size (L x W x H) mm	Weight (kg)
IMU-21	COM	-40 - +70	+28 Vdc, 42W (max)	163x 165 x 163	4.49
IMU-57	COM	-40 - +60	8-36 Vdc, 15W (max)	179x 126 x 127	2.6

### PERFORMANCE SPECIFICATIONS<sup>1</sup> (RMS ERROR)

Airborne Applications				
	SPS	RTX <sup>3</sup>	RTX Post-Processed <sup>4</sup>	SmartBase Post-Processed <sup>4</sup>
Position (m)	1.5 H	<0.1 H	< 0.1 H	<0.05 H
	3 V	<0.2 V	<0.2 V	<0.1 V
Velocity (m/s)	0.03	0.03	0.005	0.005
Roll & Pitch (deg)	0.005	0.005	0.0025 <sup>5</sup>	0.0025 <sup>5</sup>
True Heading <sup>2</sup> (deg)	0.03	0.02	0.005	0.005
Terrestrial Applications <sup>6</sup> , No GNSS Outages				
	SPS	VBS <sup>7</sup>	IARTK <sup>5</sup>	Post-Processed <sup>4</sup>
Position (m)	1.5-3.0	0.1-0.5	0.02-0.05	0.02-0.05
Velocity (m/s)	0.03	0.01	0.01	0.005
Roll & Pitch (deg)	0.005	0.005	0.005	0.005
True Heading <sup>8,9</sup> (deg)	0.02	0.02	0.02	0.015
Terrestrial Applications <sup>6</sup> , 60 second GNSS outage				
	SPS	VBS <sup>7</sup>	IARTK <sup>5</sup>	Post-Processed <sup>4</sup>
Position (m)	1.5-3.0	0.1-0.5	0.02-0.05	0.02-0.05
Roll & Pitch (deg)	0.008	0.005	0.005	0.005
True Heading <sup>8,9</sup> (deg)	0.05	0.02	0.02	0.015

<sup>1</sup> Typical performance. Actual results are dependent upon satellite configuration, atmospheric conditions and other environmental effects.  
<sup>2</sup> Typical mission profile, max RMS error  
<sup>3</sup> Trimble RTX service, typical airborne results, subject to regional coverage. Subscription sold separately.  
<sup>4</sup> POSPac MMS  
<sup>5</sup> Applanix IN-Fusion Inertially-Aided RTK, typical results  
<sup>6</sup> With DMI option  
<sup>7</sup> Virtual Base Station corrections  
<sup>8</sup> With GAMS option, 2 m baseline  
<sup>9</sup> There is no public GLONASS L3 CDMA ICD. The current capability in the receivers is based on publicly available information. As such, Trimble cannot guarantee that these receivers will be fully compatible with a future generation of GLONASS satellites or signals  
<sup>10</sup> Developed under a License of the European Union and the European Space Agency

## TECHNICAL SPECIFICATIONS

- Advanced Applanix IN-Fusion™ GNSS-Inertial integration technology
- Advanced Trimble Maxwell® 6 Custom GNSS survey technology (two chipsets)
- Primary Chipset
  - GPS: Simultaneous L1 C/A, L2C, L2E, L5
  - GLONASS: Simultaneous L1 C/A, L2 C/A, L2 P, L3 CDMA<sup>9</sup>
  - BeiDou: B1, B2
  - Galileo: Simultaneous L1 BOC, E5A, E5B, E5AltBOC<sup>10</sup>
  - QZSS: L1 C/A, L1 SAIF, L2C, L5
  - SBAS: Simultaneous L1 C/A, L5
  - L-Band: OmniSTAR VBS, HP, XP and G2, Trimble CenterPoint RTX
- Secondary Chipset
  - GPS: Simultaneous L1 C/A, L2C, L2E
  - GLONASS: Simultaneous L1 C/A, L1 P, L2 C/A, L2 P
  - BeiDou: B1
- 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
- Support for optional Distance Measurement Indicator (DMI) input
- Support for optional POSPac Mobile Mapping Suite post-processing software

## INPUT/OUTPUT

- LAN**  
 Parameters..... Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (200 Hz), raw GNSS data (5 Hz)
- Display Port ..... Low rate UDP protocol output (1 Hz)
- Control Port ..... TCP/IP input for system commands
- Primary Port ..... Real-time TCP/IP or UDP protocol output (1 – 200 Hz)
- Secondary Port ..... Buffered TCP/IP protocol output for data logging to external device (1 - 200 Hz)

- Internal Logging (1 - 200 Hz)**  
 Parameters..... Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (200 Hz), raw GNSS data (5 Hz)

- RS232 Input**  
 Parameter..... AUX GPS Input (RTK, SBAS), CMR, CMR+, RTCM v2.x, RTCM v3.x

- RS232 NMEA Output (1 - 50 Hz)**  
 Parameter..... Position (\$INGGA), Heading (\$INHDT), Track and Speed (\$INVTG), Statistics (\$INGST), Attitude (\$PASHR), Time and Date (\$INZDA), Events (\$EVT1, \$EVT2)

- Other I/O**  
 1 pulse-per-second..... 1 Time Sync output, normally high, active low pulse (configurable)
- Event Input (6) ..... Six time mark of external events. TTL pulses > 1 ms width, max rate 100 Hz

## PHYSICAL CHARACTERISTICS

- Board Set**
- Size..... 130 L x 100 W x 39 H mm (nominal)
- Weight..... 0.28 kg (nominal)
- Power..... 10 – 28 Volts DC, 20 Watts (max, with GAMS Option)
- Connectors..... I/O: Samtec QSH-060-01-L-D-DP-A-RT1  
 Samtec TFM-105-12-S-D-LC
- Antenna..... MMCX receptacle

## ENVIRONMENTAL CHARACTERISTICS

- Temperature..... -40 deg C to +75 deg C (Operational)  
 -55 deg C to +85 deg C (Storage)

TRIMBLE APPLANIX  
 85 Leek Crescent  
 Richmond Hill, Ontario  
 L4B 3B3, Canada  
 +1-289-695-6000 Phone  
 +1-905-709-6027 Fax

www.applanix.com

