



DG16 and DG14 Receivers

THE STANDARD IN ADVANCED HIGH-PRECISION OEM GPS TECHNOLOGY

SINGLE BOARD SOLUTION

The DG16™ from Thales is a low cost, new generation, sub-meter GPS+Beacon+SBAS receiver. DG16 is the perfect single board solution for high-end integration. It incorporates free of charge signals from Satellite Based Augmentation Systems (SBAS), such as WAAS, EGNOS & MSAS, and an embedded beacon receiver to provide sub-meter differential positioning.

The DG16 is a 16-channel receiver with 12 GPS L1 code and carrier channels, two SBAS channels and two DGPS beacon channels. The two SBAS channels can be configured as two additional GPS channels offering a total of 14 GPS channels. DG16 can provide up to 20 Hz precise three-dimensional position and raw data for real-time guidance and navigation. DG16 also incorporates our Integrated Differential Optimization™ techniques for using multiple sources of corrections and can output SBAS ranging, ephemeris and differential corrections as well as beacon corrections through the serial port. While DG16 offers three standard RS232 ports, it is capable of single port operation; one serial port can do it all. In addition, DG16 comes standard with User Defined Messages (UDM) software, a feature that enables the user to create custom messages.

DG16 has better signal tracking and offers Edge™ and Strobe Correlator™ technologies for multipath mitigation and better accuracy in shady environment. DG16 incorporates Receiver Autonomous Integrity Monitoring (RAIM) that allows the receiver to detect and correct errors in the satellite signals. In addition, the DG16 features Horizontal Protection Level (HPL) output for aviation applications such as Automatic Dependent Surveillance Broadcast (ADS-B) stations. DG16 consumes less power than its predecessor G12™ and can be programmed for low power/sleep mode operation. It also features improved in-band and out-of-band interference rejection capabilities. For best performance, DG16 can be configured to use a Kalman filter with adaptive dynamic mode or user can select dynamic modes such as walking, ship, aircraft, etc. to match the operating conditions.



DG14 RECEIVER

The DG14™ from Thales is a 14-Channel receiver with 12 GPS L1 Code and carrier channels and 2 SBAS channels. While the DG14 is identical to the DG16 in performance, it does not have an on-board beacon receiver. All Other features are common to both DG16 and DG14 receivers. The DG14 receiver is also available with altitude and speed limits removed (International Traffic in Arms Regulations apply) for High Dynamics and Missile Applications (HDMA).

COMPATIBILITY

DG16 and DG14 from Thales are backward compatible with G12 in both hardware and software. They both have the same RF connector and the same 30-pin connector location and pin-out as the G12. They also use the same standard Thales serial interface, allowing for easy and smooth upgrades.

DG16 AND DG14 RECEIVERS

MULTIPATH MITIGATION

Multipath is the single largest cause of differential GPS position errors. The Strobe Correlator (patent pending) is a digital signal processing technique implemented in the hardware and software of the DG16 and DG14 receivers that removes multipath errors almost entirely for reflected signals with delays of 37 m or more. This represents the best DGPS multipath mitigation available today in GPS receivers — and it is available standard with the DG16 and DG14. This means improved accuracy and greater reliability.

EVALUATION SOFTWARE

Evaluate™ software is available with the DG16 and provides visual displays of satellite information (e.g., SNR), receiver position and velocity as well as data logging and analysis. It also allows direct communication with the receiver. Compatible with all of our receivers, the software runs on Windows® version 3.x Windows 95/98, NT, 2000, and XP platforms.

TECHNICAL SPECIFICATIONS

Real-Time Position Accuracy¹

Autonomous

CEP: 3.0 m (9.843 ft)
95%: 5.0 m (16.4 ft)

Differential²

Local Base Station

CEP: 40 cm (1.31 ft)
95%: 90 cm (2.95 ft)

Beacon

CEP: 70 cm (2.30 ft)
95%: 1.6 m (5.25 ft)

SBAS

CEP: 1.0 m (3.28 ft)
95%: 3.0 m (9.84 ft)

Velocity Accuracy¹ (knots)

0.1 (95%)

Time To First Fix¹

Re-acquisition	3 sec
Hot start	11 sec
Warm start	35 sec
Cold start	90 sec

DG16/DG14 Features

- 14 Channels
 - 12 GPS code and carrier
 - 2 SBAS (WAAS/EGNOS/MSAS)
- Standard NMEA-0183 V3.0 output
- Selectable position and raw data rates up to 20Hz
- Position latency output
- Raw data output (code and carrier)
- 1 PPS (5V TTL)
 - Precision: 200 ns (stand-alone)
 - 50 ns (differential)
- Edge and Strobe Correlator
- Differential base and remote RTCM V2.3, message types 1,2,3,6,9,16, 18, 19
- 20 g tracking capability
- Kalman filter

- Event marker
- Session programming
- Integrated Differential Optimization
- Multi-base Differential with WADGPS (optional)
- Low power sleep mode
- Wide array of coordinate transformation options
- 3 bi-directional RS-232 serial ports, up to 115,000 bps
- External LED drivers
- On-board 2 Channel Beacon Receiver (DG16 Only)
- User Defined Messages (UDM)
- Receiver Autonomous Integrity Monitoring (RAIM)
- Horizontal Protection Level (HPL) Output
- Speed (max)²: 514 m/sec (1,000 knots)
- Altitude (max)²: 18287 m (60,000 feet)

Environmental & Physical

- Operating Temp: -30°C to +70°C (-22°F to 158°F)
- Storage Temp: -40°C to +85°C (-40°F to 185°F)
- Power Consumption: 1.2 W (GPS only)
1.6 W (GPS + Beacon)
0.3 W (antenna)
- Input Voltage: 5 VDC ±5%
100 mV p-p ripple
- Size: 108 mm x 57 mm (4.25 in x 2.25 in)
- Connector: 30 pins
- Weight: 65.35 gr (2.3 ounces)
- Vibration:
 - MILSPEC 810E / Category 10
 - "Minimum Integrity Test - General"
- Shock: ±40 g Operational
±75 g Non-Operational
- Acceleration: 20 G
- Humidity: 95% non-condensing

Other Configurations

DG16 and DG14 receivers are also available in a compact rugged sensor housing.

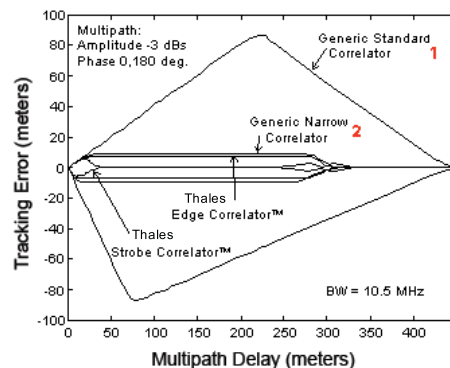
DG16 Development Kit

The DG16 Development Kit includes a DG16 GPS receiver, GPS+Beacon antenna, power supply, cables, manuals and the Thales Evaluate™ and Mission Planning™ Software. The kit is loaded with all the firmware options available.

Multipath Error Envelopes

1. Generic Standard Correlator Spacing, 1 chip
2. Generic Narrow Correlator Spacing, 0.1 chip

This figure shows the errors induced by a multipath signal half the strength of the direct signal.



The horizontal axis of the plot shows the multipath delay, this is the extra distance that the reflected signal travels compared to the direct signal. The vertical axis shows the induced range error caused by a multipath signal with the indicated delay.

From this plot you can see that typical narrow correlator performance and Edge Correlator performance is similar, while Strobe Correlator performance is much better, almost totally cancelling any multipath with a delay of more than 37 m.

¹ Accuracy and TTFF specifications based on tests conducted in Santa Clara and Moscow. Tests at different locations under different conditions may produce different results. Beacon tests based on 40 km baseline. Position accuracy may degrade with longer baselines.

Position accuracy specifications are for horizontal positioning. Vertical error is typically <2 times horizontal error.

² Altitude and Speed limitless versions are available in HDMA configuration under validated export license.

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