



**APPLICATIONS**

- Personal navigation devices
- Aftermarket vehicle navigation systems

# SiRFDirect

## Enhanced GPS + Dead Reckoning Software for Portable Devices

### PRODUCT OVERVIEW

Get the best of both worlds: the cost advantage and portability of PNDs (Portable Navigation Devices) and reliable navigation even in extremely obstructed environments—performance benchmarks previously achieved only by In-Vehicle Navigation systems. Requiring no permanent installation, SiRFDirect™ integrates GPS and Dead Reckoning sensors into a compact solution that enhances the performance of the industry-leading SiRFstarIII™ GSC3e/LP.

### GENERAL SPECIFICATIONS

#### Supported Chips

- SiRFstarIII GSC3/LP

#### GSC3f/LP Package

- Type: 140-ball thin profile, fine pitch ball grid array (TFBGA) with a ball pitch of 0.65 mm
- Dimensions: 7 mm x 10 mm  
Height: 1.4 mm
- Typical total solution footprint:  
GPS Section: 100 mm<sup>2</sup>  
Sensor Suite: 200 mm<sup>2</sup>

#### Dead Reckoning Sensor Requirements

- Three-axis MEMS accelerometer for 3D acceleration measurements
- MEMS gyro for directional measurement
- High-resolution 13-bit A/D converter

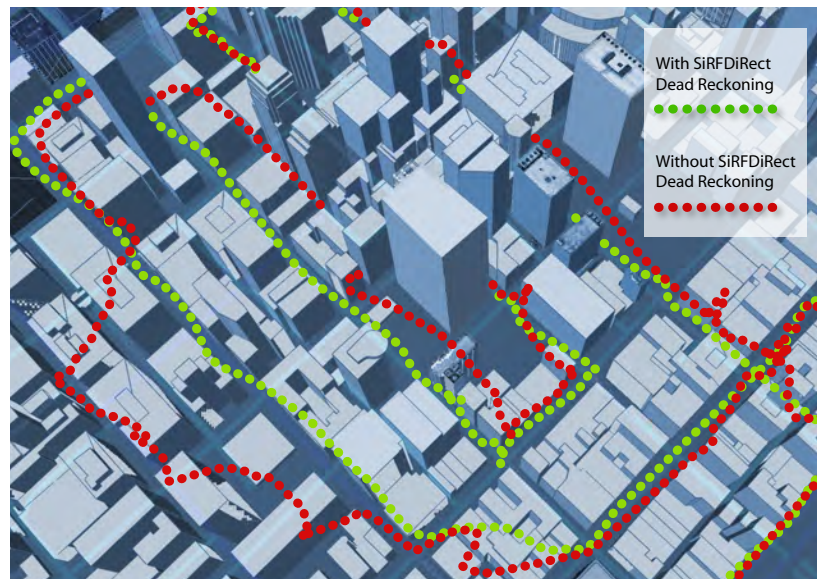
#### Additional Options

- SiRFInstantFix™ extended ephemeris service for very fast Time To First Fix (TTFF)

### KEY FEATURES

- Greater positioning accuracy in weak and degraded GPS signal environments
- No vehicle installation required; works in all vehicles
- Pick-up-and-go device transferability between vehicles
- Seamless transition between GPS, DR, and GPS + DR modes
- Multi-sensor Dead Reckoning navigation software
- Equivalent to in-dash navigation system performance at a lower cost
- Continuous and reliable navigation without GPS signal for up to one minute
- Tightly coupled Kalman Filter provides optimally tuned navigation solution
- Continuous auto-calibration of Dead Reckoning sensors with GPS

*SiRFDirect makes possible the accurate navigation of Chicago's urban canyon*



## TECHNICAL SPECIFICATIONS

### Position Accuracy<sup>1</sup>

GPS <2.5 m

### Velocity Accuracy<sup>2</sup>

Speed <0.01 m/s  
Heading <0.01°

### Time To First Fix<sup>3</sup>

Hot start - Autonomous <1 s  
Warm start – Autonomous <35 s  
Cold start - Autonomous <35 s

### Sensitivity<sup>4</sup>

Autonomous acquisition:

Warm, cold -142 dBm  
Hot -155 dBm  
Tracking -159 dBm

### Dead Reckoning Performance<sup>5</sup>

GPS outage up to 10 sec:  
Horizontal position error <10 m  
Heading error <0.5 deg  
GPS outage up to 1 min:  
Horizontal position error <225 m  
Heading error <5 deg

1. 50% 24 hr static, -130 dBm

2. 50% @ 30 m/s

3. 50% -130 dBm Fu 0.5 ppm

4. -142 dBm ≈ 28 dB-Hz with 4 dB noise figure

5. Precondition: Unit had GPS navigation for at least 2 min, with speed >3 m/sec, HDOP less than 2.5 for at least 50% of the time and with at least two 90 deg turns.

## HIGHLIGHTED ADVANTAGES

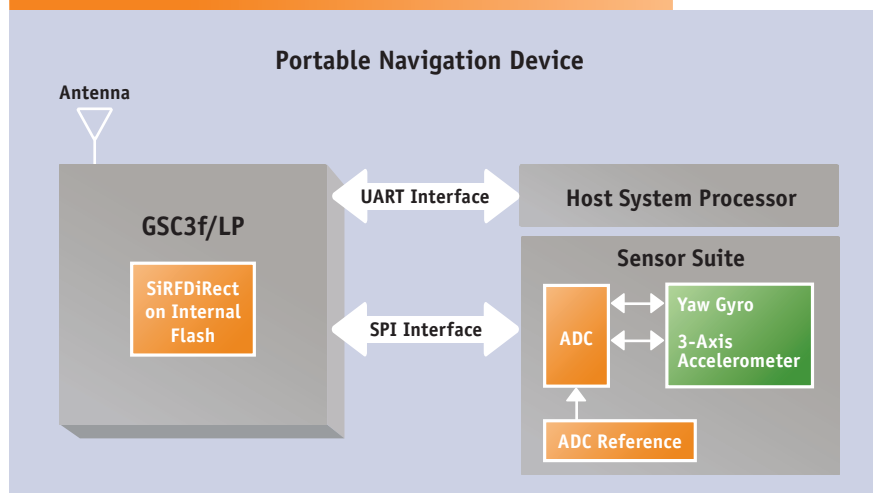
SiRFDiRect software is the latest innovation in premium navigation software, allowing the user to realize enhanced location performance and availability, typically only afforded by premium In Vehicle Navigation (IVN) systems.

In traditional IVN applications, the connection of the GPS system with the vehicle wheel speed sensor is a difficult process that tends to be unique for different makes and models, and requires a permanent installation of the navigation unit. SiRFDiRect solves this vehicle integration problem by using off-the-shelf sensor technology that provides GPS + Dead Reckoning navigation with no connection to the vehicle.

When not making use of Dead Reckoning sensors, the SiRFDiRect-enabled navigation unit provides uncompromising GPS-only positioning. When making use of Dead Reckoning sensors, SiRFDiRect allows the navigation system to deliver reliable location during periods of degraded or no GPS availability. The architecture also allows the SiRFDiRect receiver to be removed from a vehicle environment and operated as a portable GPS-only navigation device.

SiRFDiRect is compatible with the SiRFInstantFix extended ephemeris service, which eliminates the initial task of obtaining broadcast GPS data from the satellites themselves, resulting in a faster Time-To-First-Fix, even in weak signal environments.

## SiRFDiRect SYSTEM CONFIGURATION



## ORDERING INFORMATION

For more information about this and related products, contact your SiRF representative, or call our sales force at (1) (408) 467-0410, or visit [www.sirf.com](http://www.sirf.com).

For the location of your nearest authorized SiRF distributor, visit [www.sirf.com](http://www.sirf.com).

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