ROSUM
Location. Inside and Out.

# HPM
# TV-GPS Hybrid Positioning Module
# Product Brief

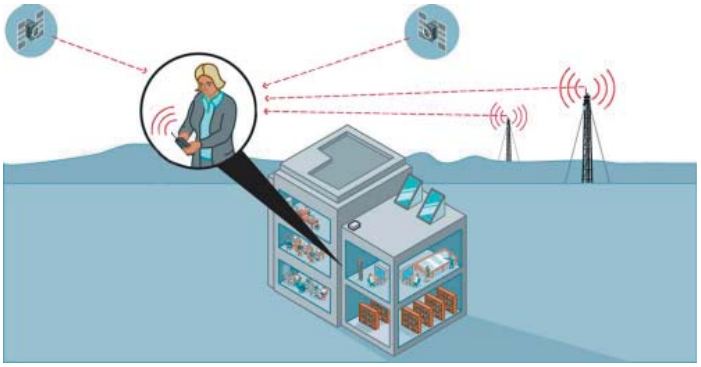
## Key Features and Benefits

- Reliable 3D location in indoor and outdoor environments
- Reliable 3D location in rural and dense urban areas
- Leverages terrestrial broadcast television infrastructure, without modification. In the US alone, there are more than 5600 high-power analog and digital TV channels.
- Autonomous Long-Term Orbit™ A-GPS positioning (provided by Global Locate Hammerhead Chip)
- Standard NMEA data output
- Flexible device control supported:
  - positioning mode (TV, TV-GPS™, GPS)
  - fix rate (cold-start, tracking)
  - power management

## Product Introduction

The Rosum TV-GPS Hybrid Positioning Module (HPM) combines the indoor accuracy and reliability of TV-positioning with the global reach of GPS. The HPM is a single-board location module for use in tracking and navigation devices. Position information is determined using the best combination of available broadcast TV and GPS signals enabling reliable location and tracking in even the most challenging environments.

## Hybrid Positioning



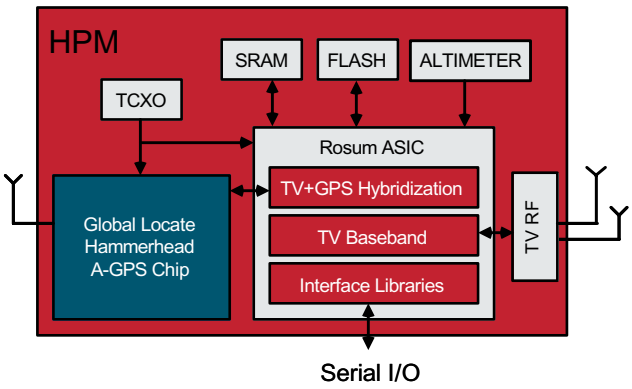
Rosum TV-positioning technology leverages the global terrestrial broadcast television infrastructure to provide location information with excellent indoor and urban availability and accuracy where other location technologies fail. Terrestrial broadcast TV signals are high-power, low-frequency signals that easily penetrate buildings and urban areas. Further, TV signals are wide in bandwidth, making them robust to errors arising from multipath. Both analog and digital signals are used. The increase in the number of on-air digital TV channels enhances Rosum's performance.

GPS location information is provided by Global Locate's Hammerhead A-GPS chip. The chipset provides highly reliable location information when satellites are visible. Rosum's hybrid TV-GPS solution enhances the performance of the A-GPS engine itself by providing accurate time and frequency assist information which substantially improves GPS acquisition time and sensitivity.

The HPM combines the ranging information provided by the TV and A-GPS components to deliver the most reliable, accurate position fix in any environment. While deep indoors, the HPM uses TV signals for positioning.

Indoors, the HPM uses the optimal mix of TV and GPS signals, choosing the best combination of signals for determining location in every micro-environment. The result is unparalleled accuracy and availability outdoors, indoors, and even in dense urban areas.

Rosum Hybrid Positioning Module




## Safety-of-Life Applications

Rosum utilizes the broadcast TV infrastructure as a distributed network of high-powered location beacons. This infrastructure is highly reliable even in disaster scenarios and is robust to jamming. Broadcast TV has demanding quality-of-service requirements and is used in the Emergency Alert System. It is well-suited to use in safety-of-life applications including:

- VoIP 9-1-1 caller location
- Asset tracking and recovery
- First responder location
- Law enforcement tracking
- Parolee tracking (offender monitoring)

Rosum service is not vulnerable to local power outages and is not dependent on volunteer "war-driving." Broadcast TV transmitter location information is managed in the United States by the FCC.

## Product Details

| Attribute | Specification |
|---|---|
| Accuracy | |
| TV-only (indoor, urban) | 10s of meters typical (Phase II E9-1-1 Compliant) |
| TV-GPS (mixed, urban) | 10s of meters typical (Phase II E9-1-1 Compliant) |
| GPS (outdoor) | 2 meter steady-state accuracy |
| Altimeter (optional) | 3 meters typical (relative) |
| | |
| Time-to-Fix | |
| Time-To-First-Fix (TV, TV-GPS) | 30 seconds typical |
| Time-To-First-Fix (GPS) | 1 second typical (-130dBm) |
| Time-To-Fix (TV, TV-GPS) | 15 seconds typical, tracking |
| Time-To-Fix (GPS) | 1 second typical, tracking |
| | |
| Power Characteristics | |
| Peak Power Consumption | 1.7 - 2.2W, depending on implementation |
| Average Power Consumption | 360mW to 2.2W, depending on fix rate, implementation |
| | |
| GPS Sensitivity | -160dBm |
| | |
| Physical | |
| Length x Width x Height | 50 x 30 x 9 mm |
| Operating Temperature Range | 0-70° C |
| | |
| Position Calculation | |
| TV-GPS | Server-based |
| GPS (and A-GPS) | Device-based |

## Availability

| Product | Date |
|---|---|
| HPM Boards | |
| Samples | October 2006 |
| Production | November 2006 |
| HPM Developer Kits | October 2006 |

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