Precision GNSS Module

PRODUCT SUMMARY

Swift Navigation's PGM (Precision GNSS Module) is designed to offer fast evaluation and a quick path to production of Swift's precise positioning solution. PGM is ideal for customers building industrial, last mile and Internet of Things (IoT) platforms with its simple to use, industry-standard mPCIe (mini peripheral component interconnect express) format. Utilizing the STMicroelectronics Teseo V chipset in a Quectel LG69T-AP module, PGM is designed specifically for Swift's Starling® positioning engine running on a host application processor to deliver real-time precision navigation. Highest performance is achieved when used with Swift's Skylark™ cloud-based corrections service.

SSR BASED TO OPTIMIZE DATA BANDWIDTH USAGE FOR IoT APPLICATIONS

Swift's PGM solution supports end-to-end SSR (State Space Representation) format corrections when connected to Swift's wide area corrections service Skylark. SSR format corrections reduce bandwidth usage compared to traditional OSR (Observation Space Representation) while supporting highest performance.

MULTI-BAND, MULTI-CONSTELLATION

Starling features multi-band, multi-constellation support to provide centimeter-level accuracy and to enable fast convergence time with an overall strong performance. PGM supports operation on the L1 and L5 bands of GPS, Galileo and BeiDou.

INTEGRATED IMU & VEHICLE INPUT CAPABILITY

PGM provides dead reckoning capabilities with a leading-edge integrated ASM330 Inertial Measurement Unit (IMU) to provide continual high-precision positioning together with the ability to receive vehicle sensor input such as velocity. The state of the art integrated algorithms in Starling fuse between the IMU data, GNSS measurements, wheel ticks and vehicle dynamics model to provide lane accurate positioning where GNSS alone would fail.

EASILY CONFIGURABLE

PGM is easily configurable and supports multiple general-purpose input/output (GPIO) configurability for vehicle interfaces, such as vehicle velocity inputs. Two PGMs can be configured to support dual-antenna heading.

ACTIVE ANTENNA SUPPORT

PGM has integrated antenna bias, supporting an active GNSS antenna for best performance. The module supports current sensing and short circuit protection in antenna bias, to enable high reliability vehicle installs and ongoing diagnostics information.

INDUSTRY-STANDARD FORMAT

PGM is a precision GNSS receiver created to deliver maximum flexibility of design and performance in a simple to use, industry standard mPCIe format. Suitable for use in a wide range of mobile IoT compute platforms supporting mPCIe cards, it represents a fast and simple way to bring precise positioning to a wide variety of applications.

HOSTED POSITIONING ENGINE SOLUTION

PGM is designed to operate with Swift's positioning engine, Starling, operating on the customers platform. There are a number of benefits from a hosted architecture, ranging from lower overall hardware costs, broader design flexibility, simpler firmware update management and not having constraints applied to performance due to limited compute or interface capabilities in the GNSS module.

BENEFITS

- < 4 cm Accuracy*
- < 5s convergence to 25cm accuracy, when using Skylark corrections
- Dead Reckoning Support Delivers High Performance in Urban Areas
- Based on ST Micro's Leading-Edge Teseo V Measurement Engine in a Quectel Module

FEATURES

- Lane-Level Accurate Positioning
- SSR Format Corrections Support
- Industry Standard mPCIe Format
- Supports GPS L1CA & L5, BeiDou B1i & B2a, Galileo E1 & E5a, SBAS
- Integrated IMU
- Digital Wheel Tick / Reverse and CAN Inputs
- Optional on-board battery to support reduced time to first fix (hot start)
- Off-board connector for long term battery backup
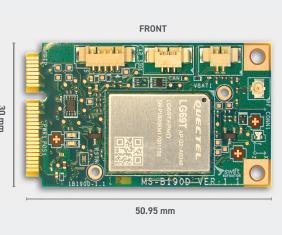- Configure two PGMs to support dual-antenna heading

*Actual system performance may vary, dependent but not limited to: use-case dynamics, receiver and antenna characteristics. 4 cm 50% accuracy measured over 24 hours stationary with open sky using Skylark SSR and a GPS1000 mini-survey antenna.

PGM Integration

PGM is ideally suited as a sensor add-on to embedded computing platforms with mini PCIe expansion slots for applications that require precision position or timing features such as automotive, robotics, high precision data collection, video/sensor position and time-tagging. PGM is designed specifically for Swift's Starling positioning engine on a host application processor to deliver real-time precision navigation with dual-frequency L1/L5 carrier phase differential RTK GNSS and inertial / odometer sensor fusion.

SPECIFICATIONS

Dimension	50.95 mm x 30 mm Mini PCIe "Full"
Antenna	U.FL connector for Active L1/L5 GNSS Antenna. Optional user-provided antenna bias
GNSS Constellations and Signals	• GPS L1CA & L5 • BeiDou B1 & B2a • Galileo E1 & E5a • SBAS
IMU	Automotive-grade 6 DOF IMU (ST ASM 330) with best-in-class performance
Precision Wheel Odometry Input	Edge-mount connector for wheel tic and reverse indicator vehicle inputs
Input / Output	• mPCIe USB 2.0 interface to serial UART adapter (2x UART up to 460800 baud) • 1x CAN edgemount interfaces compatible with high speed CAN and CAN-FD
Serial Protocols	• Raw RTCMv3 MSM GNSS observations (up to 10Hz) • Custom RTCMv3 messages for inertial and vehicle data • UART command, configuration and control • Firmware upgrade over UART
Environmental	-40°C to +85°C operating range Designed for vehicle vibration

FRONT

30 mm

50.95 mm

BACK

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