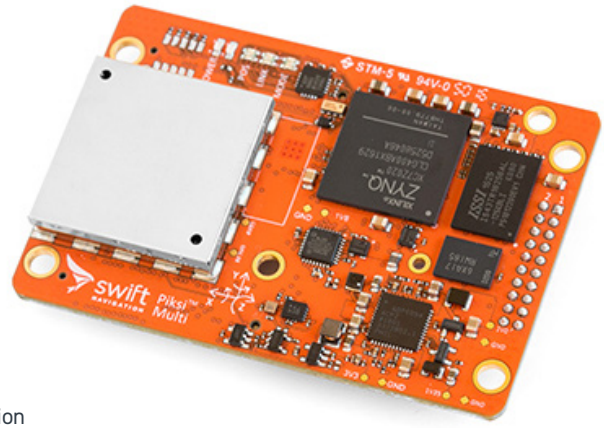
Piksi® Multi

Product Summary

Multi-Band, Multi-Constellation Centimeter-Accurate GNSS

The Piksi Multi GNSS receiver from Swift Navigation. Its dual-frequency operation offers fast RTK convergence times and reliable, centimeter-accurate results at a breakthrough price.



Centimeter-Level Accuracy

Autonomous systems require precision navigation—especially those that perform critical functions. Swift Navigation solutions utilize real-time kinematics (RTK) technology, providing location solutions that are 100 times more accurate than traditional GPS.

Fast Convergence Times

Multiple signal bands enable fast convergence times to high-precision mode. Single band RTK systems converge in minutes, while Piksi Multi converges to a high-precision solution within seconds. This allows for much faster system start times, as well as faster reacquisition, which is critical to robotic systems.

Robust Positioning Performance

Piksi Multi supports GPS L1/L2 and GLONASS G1/G2 for RTK measurements and positioning and SBAS for robust sub-meter positioning in non-RTK mode. It is hardware-ready for simultaneous reception of the other two global GNSS constellations: BeiDou and Galileo. Additional constellations create more robust positioning performance in a variety of challenging skyview environments. Integrated MEMS oscillator technology enhances robustness under vibration and shock. Integrated MEMS IMU technology allows for sensor fusion techniques that enhance positioning performance.

Open Platform

Piksi Multi features a powerful Xilinx Zynq® processor with an FPGA and dual-core ARM® Cortex®-A9 processors. Plenty of computational headroom and on-board Linux enable seamless integration of customer applications.

Rapid Prototyping

Piksi Multi is designed to be easy to use. The Piksi Multi Evaluation Kit includes: 2 Piksi Multi GNSS Modules; 2 integrator-friendly Evaluation Boards; 2 GNSS survey grade antennas; 2 powerful radios and integration accessories. Piksi Multi features multiple high-density I/O connectors, providing an enhanced and improved integration experience.

Breakthrough Price

Swift Navigation is built on the notion that highly-precise RTK solutions should be offered at an affordable price. Piksi Multi embraces the foundation of unmatched affordability and is available at a much lower cost than comparable systems.

Benefits

- Fast RTK Convergence Times
- Highly-Competitive Pricing
- Easy Integration into a Variety of Applications
- Future-Proof Hardware with In-Field Software Upgrades
- Onboard Linux Allows Flexibility

Features

- Dual Frequency and Dual Constellation
- Up to 20 Hz Solution Rates
- Advanced MEMS Oscillator Technology
- Raw IMU Data Stream Through On-Board MEMS IMU
- Flexible Interfaces Including UART, Ethernet, CAN[5] and USB

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Piksi Multi

GNSS Characteristics

GNSS Signal Tracking

- GPS L1/L2, GLONASS G1/G2[1]
- SBAS[2]

GNSS Data Rates

Measurements (Raw Data)	Up to 20 Hz
Standard Position Outputs	Up to 20 Hz
RTK Position Outputs	Up to 10 Hz[3]

- Swift Binary Protocol (SBP) and NMEA-0183

Maximum Operating Limits[4]

Altitude	18,000 m
Velocity	515 m/s

Electrical & I/O

Power

Input Voltage	5 - 15 V DC
Typical Power Consumption[5]	2.9 W

Antenna LNA Power Specifications

Output Voltage	4.85 V DC
Max Output Current	100 mA

Connectors

- 1 x 20 Pin SAMTEC Connector (PN: TMM-110-03-F-D)
- 2 x 60 Pin High Density Connectors (PN: 61082-061400LF)
- 1 x MMCX Female Antenna Port

Communication Interfaces

- 2 x UART-LVTTL Ports (1 Mbps)
- 2 x CAN[6] Bus (1 Mbps)
- Ethernet support up to 100Mbps
- 2 x USB 2.0 (1 Device, 1 Host)

Physical & Environmental

Dimensions[7]	48 mm x 71 mm x 12.4 mm Form factor compatible with common GNSS modules
Weight	26 g
Temperature[8]	
Operating	-40° C to +85° C
Storage	-40° C to +85° C
Humidity	95% non-condensing as measured by MIL-STD-810G, Method 507.5 Procedure II
Vibration (Operating and Survival)	
Random	MIL-STD 810G, Method 514.6 (Category 24, 7.7 g RMS)
Sinusoidal	IEC 60068-2-6 (Test Fc–5g)
Mechanical Shock	
Operating	MIL-STD 810G, Method 516.6, Procedure I (40 g)
Survival	MIL-STD-810G, Method 516.6, Procedure V (75 g)

Position Performance Specifications

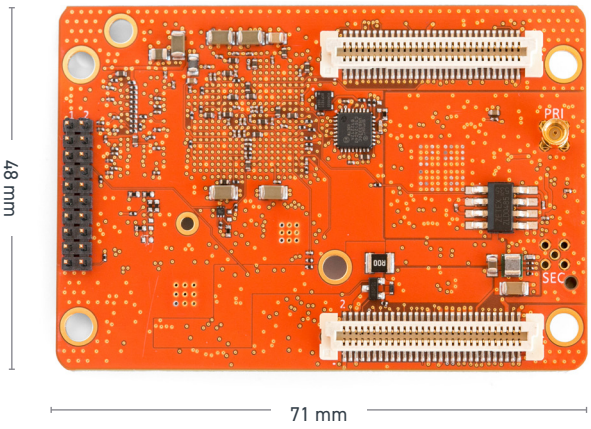
Position, Velocity & Time Accuracy

Horizontal Position Accuracy (CEP 50 in SBAS Mode)	0.75 m[9]
Velocity Accuracy	0.03 m/s RMS
Time Accuracy	60 ns RMS
Real Time Kinematic (RTK Accuracy 1σ)	
- Horizontal	0.010 m + 1 ppm
- Vertical	0.015 m + 1 ppm
RTK Initialization Parameters	
- Initialization Time	< 10 s
- Initialization Reliability	> 99%
- Solution Latency	< 30 ms

Time to First Fix (TTFF) Specifications[9]

Hot Start[10]	Cold Start[11]	Re-acquisition[12]
< 5 s	< 60 s	< 2 s

Actual Size



Packaging & Accessories

Visit the Swift online store at www.swiftnav.com

Piksi Multi Evaluation Kit
Designed to provide a seamless easy-to-use RTK positioning experience through a single kit consisting of 2 Piksi Multi GNSS Modules; 2 Evaluation Boards; 2 GNSS survey grade antennas; 2 powerful radios and all other required integration accessories.

Piksi Multi GNSS Receiver Pack
Quick integration packs designed both for customers seeking to create custom RTK solutions for unique projects or for seasoned RTK systems integrators.

Piksi Multi GNSS Module
Designed for the experienced systems integrator and the large volume enterprise customer.

[1] Hardware-ready for BeiDou B1/B2, Galileo E1/E5b, QZSS L1/L2. Piksi Multi GNSS Module has the RF front end to receive these signals but there are no precise implementation dates for future satellite systems.

[2] SBAS Support includes the United States-based Wide Area Augmentation Systems (WAAS), the pan-European Union-based European Geostationary Navigation Overlay Navigation System (EGNOS), the Japanese Multifunctional Transport Satellites (MTSAT) Satellite Augmentation System (MSAS) providing coverage for Japan and Australia and the GPS-Aided GEO Augmented Navigation (GAGAN) regional system operated by the Indian government.

[3] Current FW supports 10Hz GPS L1/L2C + GLN G1/G2 (low latency) or 5 Hz GPS L1/L2C + GLN G1/G2 (time matched).

[4] As required by the U.S. Department of Commerce to comply with export licensing restrictions.

[5] Typical power consumption by module in L1/L2 RTK positioning mode.

[6] The CAN implementation Bus on Piksi Multi is currently hardware ready and is electrically verified. We do not support any specific CAN output protocol (eg. J1939) and have no immediate plans to do so. To help customers design specific CAN protocols, we have plans to release open Linux documentation to help integrators implement their own CAN messages.

[7] A hardware update on the Piksi Multi to use a higher grade CPU with better thermal characteristics was implemented, resulting in 0.4mm height increase of the Piksi Multi. Contact customer support for more information on this.

[8] The use of an on-board heat sink may be required only in some rare cases. The module ships with a provided heat sink attachment.

[9] In open sky and strong signals conditions.

[10] Hot Start is the time taken by the receiver to achieve a standard position fix after a brief outage. For example, the time taken to fix a position for a car that is exiting a long tunnel. This can also be simulated by a simple RF on/off test with outages between 30 and 50 seconds.

[11] Cold Start is the time taken by the receiver to achieve a standard position fix after a prolonged outage. For example, the time taken to achieve a position fix for a car that has been parked overnight in a garage and once it sees the sky view for the first time.

[12] Re-acquisiton is defined as the time taken to re-acquire position lock after brief moment of outage. For example, a car traveling under a freeway/highway overpass. This can also be simulated by a simple RF on/off test with outages between 1 and 5 seconds.