



# Piksi® Multi

## Product Summary



### Multi-Band, Multi-Constellation Centimeter-Accurate GNSS

The Pixsi 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 Pixsi 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 for RTK measurements and positioning and GLONASS L1/L2 measurements for PPK use cases. 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

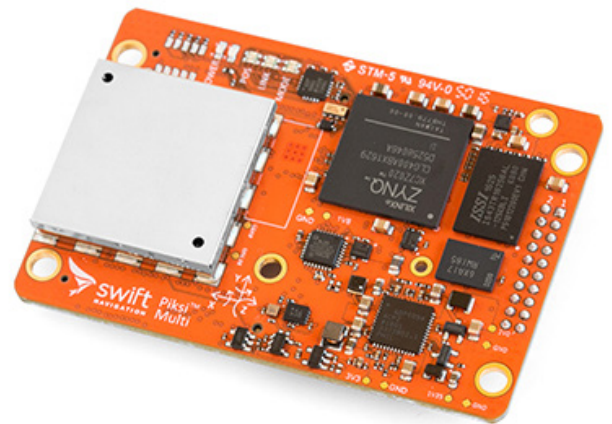
Piksi Multi features a powerful Xilinx Zynq® processor with an FPGA and dual-core ARM® Cortex®-A9 processors. Plenty of computational headroom and on-board Linux enable seamless integration of customer applications.

#### Rapid Prototyping

Piksi Multi is designed to be easy to use. The Pixsi Multi Evaluation Kit includes: 2 Pixsi Multi GNSS Modules; 2 integrator-friendly Evaluation Boards; 2 GNSS survey grade antennas; 2 powerful radios and integration accessories. Pixsi 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. Pixsi 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
- 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<sup>6</sup> and USB

# Piksi Multi

## GNSS Characteristics

### GNSS Signal Tracking

GPS GLONASS L1/L2<sup>1</sup>

### GNSS Data Rates

Measurements (Raw Data)	Up to 20 Hz <sup>2</sup>
Standard Position Outputs	Up to 20 Hz
RTK Position Outputs	Up to 10 Hz <sup>3</sup>
Swift Binary Protocol (SBP) and NMEA-0183	

### Maximum Operating Limits<sup>4</sup>

Altitude	18,000 m
Velocity	515 m/s

## Position Performance Specifications

### Position, Velocity & Time Accuracy

Horizontal Position Accuracy (CEP 50 in SPP Mode)	2.5 m
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<sup>9</sup>

Hot Start <sup>10</sup>	Cold Start <sup>11</sup>	Reacquisition <sup>12</sup>
< 7 s	< 60 s	< 2 s

## Electrical & I/O

### Power

Input Voltage	5 - 15 V DC
Typical Power Consumption <sup>5</sup>	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<sup>6</sup> Bus (1 Mbps)
- 100 Mbit Ethernet
- 2 x USB 2.0 (1 Device, 1 Host)

## Physical & Environmental

### Dimensions<sup>7</sup>

48 mm x 71 mm x 12.4 mm  
Form factor compatible with common GNSS modules

### Weight

26 g

### Temperature<sup>8</sup>

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

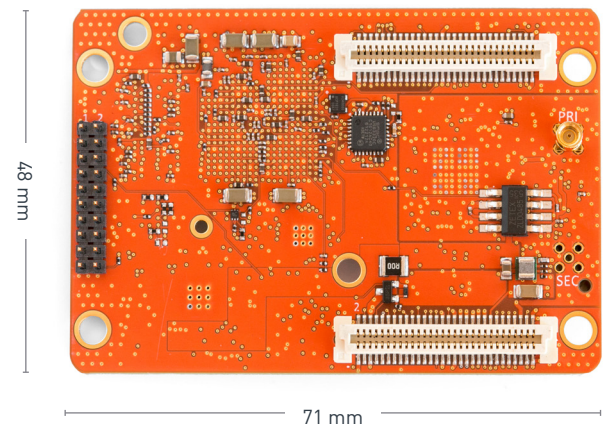
### Vibration (Operating and Survival)

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)

### Actual Size



## Packaging & Accessories

Visit the Swift online store at [www.swiftnav.com](http://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.

<sup>1</sup> Hardware-ready for BeiDou B1/B2, Galileo E1/E5b, QZSS L1/L2 and SBAS (Satellite Based Augmentation Systems such as WAAS & EGNOS). Piksi Multi GNSS Module has the RF front end to receive these signals but there are no precise implementation dates for future satellite systems.

<sup>2</sup> Piksi Multi FW 1.2 will support Raw GNSS Data Observations (L1/L2 GPS+GLN) up to 20 Hz or 10 HZ RTK solution output, but not both simultaneously.

<sup>3</sup> Current FW supports 10Hz GPS L1/L2C (low latency) or 5 Hz GPS L1/L2C (time matched) or 5Hz GPS/GLN L1/L2 (low latency only).

<sup>4</sup> As required by the U.S. Department of Commerce to comply with export licensing restrictions.

<sup>5</sup> Typical power consumption by module in L1/L2 RTK positioning mode.

<sup>6</sup> 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.

<sup>7</sup> 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.

<sup>8</sup> 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.

<sup>9</sup> In open sky and strong signals conditions.

<sup>10</sup> 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.

<sup>11</sup> 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.

<sup>12</sup> Reacquisition 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.