





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

Swift Navigation, in partnership with Carnegie Robotics, introduces Duro—an enclosed version of the Piksi® Multi dual-frequency RTK receiver. Built for the outdoors, Duro combines centimeter-accurate positioning with military ruggedness at a breakthrough price.



Built to Be Tough

Duro leverages design principles typically used in military hardware and results in an easy-todeploy sensor, protected against weather, moisture, vibration, dust, water immersion and unexpected circumstances that can occur in long-term, outdoor employments.

Easy Integration

Duro's M12 connectors are sealed and industry standard, which balances ruggedization perfectly with user-friendliness. No external sealing is required to deploy in even the harshest conditions. The exposed interfaces support varied use cases without integration headaches.

Centimeter-Level Accuracy

Autonomous devices require precise navigation—especially those that perform critical functions. Swift Navigation's Piksi Multi module within Duro utilizes 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, critical to robotic systems.

Field Upgradeable

Swift Navigation and Carnegie Robotics have partnered to create a product that offers a technology development platform that can easily be software-upgraded to leverage Swift Navigation's and Carnegie Robotics' future intellectual property and technology.

Leverages Piksi Multi

Multiple signal bands enable fast convergence times and multiple satellite constellations enhance availability. Piksi Multi supports GPS L1/L2 and GLONASS G1/G2 for RTK measurements and positioning. Other constellations such as BeiDou, Galileo, SBAS are planned to be rolled out in the near future. No additional upgrade charges for constellation upgrades.

Benefits

- Ruggedized Sensor for Long-Term Deployment
- Uses Swift Navigation's Piksi Multi
- Highly-Competitive Pricing
- · Flexible Mounting Interfaces
- Future-Proof Hardware with In-Field Software Upgrades
- Intuitive LEDs for Status and Diagnostics
- Electrical Protection on all IO
- Durable and Chemical Resistant Powder-Coating
- · Passive Thermal Design

Features

- IP67 rated
- · Centimeter-Level Positioning
- Dual Frequency GNSS RTK
- Raw Data Outputs from On-Board MEMS IMU



Mechanical Shock

Operating

Survival

Physical & Environmental

Dimensions	130 mm x 130 mm x 65 mm
Weight	0.8 kg (Cast Al Housing)
Temperature Operating Storage	-40° C to +75° C -40° C to +85° C
Humidity	95% non-condensing
Sealing	IP67
Vibration Operating and Survival (R	andom Vibe) 7.7 g

Electrical & I/O

Power

5 g

40 g

75 g

Input Voltage¹ 10 - 35 V DC
Typical Power Consumption² 5.0 W

Antenna LNA Power Specifications

Output Voltage 4.85 V DC
Max Output Current 100 mA

External Connector Ports

- 2 x RS232 Serial Ports with Optional Hardware Flow Control
- Ethernet support up to 100Mbps
- PPS, PV, 3 x Event Inputs
- CANBus with Selectable Termination Resistor
- Configurable Digital Inputs and Outputs
- 12 V at 1A and 5 V at 250mA Power Outputs

GNSS Characteristics

GNSS Signal Tracking

GPS L1/L2C and GLONASS G1/G23

GNSS Data Rates⁴

Measurements (Raw Data)

Standard Position Outputs

RTK Position Outputs

Up to 20 Hz

Up to 20 Hz

Up to 10 Hz

Swift Binary Protocol (SBP) and NMEA-0183

Maximum Operating Limits⁵

GNSS ANTENNA

Antenna

Chassis

Pin

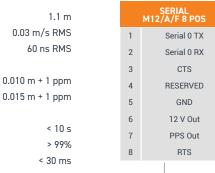
Body

Altitude	18,000 m
Velocity	515 m/s

Position Performance Specifications⁶

Operating and Survival (Sinusoidal Vibe)

Position, Velocity & Time Accuracy Horizontal Position Accuracy (CEP 50 in SPP Mode) Velocity Accuracy Time Accuracy Real Time Kinematic (RTK Accuracy 10) - Horizontal - Vertical RTK Initialization Parameters - Initialization Time - Initialization Reliability - Solution Latency



	1	CAN Low
	2	5V Out
	3	RTS
	4	CTS
	5	12V Out
	6	GND
	7	RESERVED
	8	RESERVED
	9	RESERVED
	10	TX
	11	Rx
	12	CAN High
	13	PPS
_	14	GND
	15	RESERVED
	16	RESERVED
	17	DO/PV

CELLULAR MODEM ANTENNA SMA⁷

AUX M12-A/F 17 POS



TX +



- $^{\rm 1}$ Maximum allowed input Voltage range. Recommended Voltage input range from 12 24V
- 2 $\,$ Power draw without cell modem activated \sim 5W. Power draw with cell modem active \sim 6W
- ³ 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.
- ⁴ Please refer the Piksi Multi product summary for additional specifics.
- $^{\rm 5}$ As required by the U.S. Department of Commerce to comply with export licensing restrictions.
- ⁶ In open sky and strong signals conditions.
- ⁷ Currently a Beta Feature. While this feature is currently available to end-customers and can be used, it still has a Beta developmental status. This implies that while the feature will work, there is a potential for unknown firmware bugs which Swift Navigation is or isn't aware of. Customers using this feature need to note that user documentation for it may not be fully complete and Swift Navigation is not liable for customers intending to use a Beta feature in a final production environment.

