# Duro®

Product Summary

Carnegie Robotics®

swift NAVIGATION

## 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-to-deploy 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 platforms require precise positioning—especially those that perform critical functions. Swift Navigation's Piksi Multi receiver within Duro utilizes real-time kinematics (RTK) technology, providing location solutions that are 100 times more accurate than traditional GNSS solutions.

### 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 faster time to first fix (TTFF), as well as faster reacquisition times which are critical in high dynamic autonomous applications within a variety of environments.

### Leverages Piksi Multi

Multiple signal bands enable fast convergence times and multiple satellite constellations enhance availability. Piksi Multi supports GPS L1/L2, GLONASS G1/G2, BeiDou B1/B2 and Galileo E1/E5b for RTK measurements and positioning and SBAS for robust sub-meter positioning in non-RTK mode. 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

 

# Duro®

## Physical & Environmental

| | |
|---|---|
| Dimensions | 130 mm x 130 mm x 65 mm |
| Weight | 0.8 kg (Cast Al Housing) |
| Temperature | |
| Operating | -40° C to +75° C |
| Storage | -40° C to +85° C |
| Humidity | 95% non-condensing |
| Sealing | IP67 |
| Vibration | |
| Operating and Survival (Random Vibe) | 7.7 g |
| Operating and Survival (Sinusoidal Vibe) | 5 g |
| Mechanical Shock | |
| Operating | 40 g |
| Survival | 75 g |

## Electrical & I/O

**Power**

| | |
|---|---|
| Input Voltage[1] | 10 - 35 V DC |
| Typical Power Consumption | 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 100 Mbps
- PPS, PV, 3 x Event Inputs
- CANBus with Selectable Termination Resistor
- Configurable Digital Inputs and Outputs
- 12 V at 1A and 5 V at 250 mA Power Outputs

## GNSS Characteristics

**GNSS Signal Tracking**

GPS L1/L2, GLONASS G1/G2,
BeiDou B1/B2, Galileo E1/E5b
SBAS (WAAS, EGNOS, GAGAN, MSAS)

**GNSS Data Rates[2]**

| | |
|---|---|
| Measurements (Raw Data) | Up to 20 Hz |
| Standard Position Outputs | Up to 20 Hz |
| RTK Position Outputs | Up to 10 Hz |

Swift Binary Protocol (SBP) and NMEA-0183

**Maximum Operating Limits[3]**

| | |
|---|---|
| Velocity | 515 m/s |

## Position Performance Specifications[4]

**Position, Velocity & Time Accuracy**

| | |
|---|---|
| Horizontal Position Accuracy (CEP 50 in SBAS Mode) | 0.75 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 |

| SERIAL M12/A/F 8 POS | |
|---|---|
| 1 | Serial 0 TX |
| 2 | Serial 0 RX |
| 3 | CTS |
| 4 | EVENT C |
| 5 | GND |
| 6 | 12 V Out |
| 7 | PPS Out |
| 8 | RTS |

| AUX M12-A/F 17 POS | |
|---|---|
| 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 | EVENT B |
| 17 | DO/PV |

| ETHERNET M12-D/F 4 POS | |
|---|---|
| 1 | TX + |
| 2 | RX + |
| 3 | TX - |
| 4 | RX - |

| POWER M12/A/M 5 POS | |
|---|---|
| 1 | Voltage In |
| 2 | Chassis GND |
| 3 | Power GND |
| 4 | PPS |
| 5 | Event A |


| GNSS ANTENNA TNC | |
|---|---|
| Pin | Antenna |
| Body | Chassis |

[1] Maximum allowed input Voltage range. Recommended Voltage input range from 12 - 24 V.
[2] Please refer the Piksi Multi product summary for additional specifics.
[3] As required by the U.S. Department of Commerce to comply with export licensing restrictions.
[4] In open sky and strong signals conditions.



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