VersaPNT – Assured Position, Navigation, and Time in a Single Solution

Applications

Airborne
- Observation payload (radar, optronics, electronic warfare)
- Flying test bench
- Flight analysis
- Tactical UAV navigation

Ground
- Blue Force Tracking
- Vehicle navigation
- Satcom On The Move (SOTM)
- Anti IED jamming systems
- Mobile radios and C4ISR
- Robotics

Marine/Naval
- Sensor support (radars, sonars, optronics, electronic warfare)
- Communication networks
- Offshore/DSO platforms

Accurate in All Conditions
- GNSS-aided inertial navigation and timing
- High performance internal timebase and inertial sensor to manage potential loss of GNSS
- GNSS time and frequency source with NTP/PTP time server
- Integrate future PNT signal sources (STL, CAN Bus, etc.)

Flexible
- High versatility with software configurable inputs/outputs
- Network sync, set-up & management
- Easy integration with small footprint and low power consumption
- Compatible with external IMU's
- Victory compatible

Compact/Rugged
- Ruggedized (MIL-STD-810G)low size, weight and power
- Conduction-cooled
- Mil-performance connectors
- Standby power mode
- Configurable for multiple vehicle and airframe platforms

A Resilient Position, Navigation, and Timing (PNT) Sensor Fusion Platform

The VersaPNT combines a GNSS receiver, inertial measurement technology, and high-performance timing oscillators to provide Assured PNT in GNSS degraded and denied environments. The rugged and highly customizable device serves as a navigation system, master clock, and network time server for mobile applications in harsh environmental conditions. It delivers accurate, software-configurable position, navigation, altitude, time, and frequency signals under all circumstances. VersaPNT minimizes size, weight, and power (SWaP) by combining PNT functions normally achieved through multiple independent subsystems, allowing for efficient integration into myriad ground, air, and maritime platforms.

High Performance GPS Aided Inertial Navigation System (INS)

VersaPNT provides extremely accurate positioning, attitude and orientation measurements, even in GNSS denied environments. Measurement data is logged internally and streamed at a high output rate through a serial or LAN interface. VersaPNT is available with several GNSS receiver and IMU configurations, including SAASM.

Backed by more than four decades of Spectracom's timing solutions expertise, VersaPNT includes all the timing functionality required in modern, network-centric applications:

- NTP/PTP precise time transfer over Ethernet, including security protocols that prevent network vulnerabilities#
- Low phase noise 10 MHz frequency distribution
- Configurable pulse signals, including IRIG or HaveQuick timecodes
- Serial link Time Of Day (ToD) messages

High-Performance Time Server

VersaPNT maintains an accurate internal timescale with very low power consumption via a low-phase noise OCXO, micro-rubidium or CSAC oscillator, holding frequency and time accuracy for long periods of GNSS outage. It can also be re-synchronized by an external reference. Precise time and frequency signals are available as 1PPS, unmodulated IRIG B timecode, 10MHz, and NMEA time-of-day messages. PTP and NTP servers provide accurate time distribution over an IP network.

Reliable, Configurable, Versatile

VersaPNT incorporates a software-programmable I/O switch that allows the user to quickly configure electrical and data interfaces through the web interface. Two Gigabit Ethernet ports and combinations of DCLS, RS-232, and RS-485 interfaces are available in the base VersaPNT. If additional interfaces are required, the VersaPNT can accommodate an internal option board to add additional existing interfaces (such as more RS-232 ports) or new ones (IRIG AM, 1553 aircraft bus).

Several methods of real-time system monitoring are available both locally and remotely. Analog and SNMP alarms allow the system operator to quickly recognize and diagnose issues. The exportable system event log provides information for in-depth analysis.

In addition to multiple oscillator options, the VersaPNT is available with a C/A L1 GPS receiver or L1/L2 GPS SAASM receiver.

Timing Interfaces

Timing Inputs

GNSS L1, 72 Channel Receiver
- *SMA connector, 5 V_{DC} to GNSS antenna*

SAASM GPS, L1/L2 GPS (optional)
- *Adds keyloader connection*

DCLS Configurable Inputs (TTL level, 10V)
- *1PPS*
- *IRIG B DCLS, HaveQuick*

Time of Day Message (NMEA0183, HaveQuick)
- *Over RS232, RS485*

Network Inputs
- *NTP Stratum2*
- *IEEE1588 v2 Slave*

Timing Outputs

DCLS Configurable (up to 3x TTL outputs, 1x 10V output)
- *1PPS, any pulse up to 10MHz*
- *IRIG B unmodulated, HaveQuick*

RS232 and RS485
- *NMEA 0183 time of day message (GPZDA, GPRMC)*
- *HaveQuick*

Frequency (x 1)
- *10 MHz, sine, +0dBm, SMA connector*

Network Interface (10/100/1000bT)
- *NTP server (v3, v4)*
- *PTP IEEE1588 v1, v2 master*

Timing and Frequency Performance

Performances	OCXO	CSAC	MAC
Timebase Performances			
Relative Frequency Variation with Aging: - 24 hours - One month - One year	 5×10^{-10} 1×10^{-8} 5×10^{-8}	 – 3×10^{-10} 1×10^{-9}	 $\pm 2.5 \times 10^{-11}$ $\pm 1 \times 10^{-11}$ $\pm 1 \times 10^{-9}$
Relative Frequency Variation with Temperature (0°C to 60°C)	$\pm 5 \times 10^{-8}$	$\pm 5 \times 10^{-8}$	$\leq 1 \times 10^{-10}$
Short Term Stability (Allan Variance): @ 1 s @ 10 s @ 100 s	 1×10^{-9} 1×10^{-10} 3×10^{-11}	 3×10^{-10} 8×10^{-11} 3×10^{-11}	 $\leq 3 \times 10^{-11}$ $\leq 1.6 \times 10^{-11}$ $\leq 8 \times 10^{-12}$
Phase Noise on 10MHz Output: @ 10Hz @ 100Hz @ 1kHz @ 100kHz	 -120dBc/Hz -140dBc/Hz -150dBc/Hz -155dBc/Hz	 -70dBc/Hz -113dBc/Hz -128dBc/Hz -140dBc/Hz	 <-87dBc/Hz <-114dBc/Hz <-130dBc/Hz –
Harmonic Distortion	-40dBc		
Spurious	-60dBc		<-85dBc
System Performances			
Frequency Accuracy Averaged Over 24 hour when Locked on GNSS	5×10^{-12}	1×10^{-12}	3×10^{-13}
Phase (1 PPS) Drift in Holdover (no reference available) - 4 hours - 24 hours - 7 days	 3 µs 40 µs 1.2 ms	 1 µs 7 µs 100 µs	 .35 µs 2.2 µs 15 µs
Phase (1 PPS) accuracy to UTC	±50ns		

Interfaces (Power, Communications, I/O)

Interface	Type of Data	Connector
GNSS RF In (1x)	GNSS signal	SMA
Power In (1x)	DC power	Circular
Frequency Out (1x)	10MHz sine	SMA
GPIO In/Out	Up to 3x TTL and 1x 10V outputs Any rate up to 10MHz IRIG B (unmodulated) HaveQuick	Circular
RS232 In/Out	Up to 2x RS232 outputs NMEA messages	Circular
RS485 In/Out	Up to 3x RS485 outputs NMEA messages	Circular
Ethernet In/Out	NTP, PTP Monitoring VICTORY	Circular
USB	1 USB connector	Circular
SAASM Keyfill	DS101	Dedicated circular connector

Navigation Performance

(Dependent on GNSS satellite performance, ionospheric conditions, signal blockage and other factors. Typical, clear-sky performance is provided.)

Performance		
Receiver Type	GPS and SAASM	GPS and SAASM
IMU Sensor Type	Internal MEMS	Internal MEMS (High performance)
Position Accuracy (Horizontal)	2.5m RMS (GPS L1) 2.0m (GPS L1 w/SBAS)	2.5m RMS (GPS L1) 2.0m (GPS L1 w/SBAS)
Position Accuracy (Vertical)	5.0m RMS (GPS L1) 2.5m RMS (GPS L1 w/SBAS)	5.0m RMS (GPS L1) 2.5m RMS (GPS L1 w/SBAS)
Velocity Accuracy	±0.05 m/s	±0.05 m/s
Roll & Pitch Accuracy (Dynamic)	0.1° RMS	<0.03° RMS
Heading Accuracy (Dynamic)	0.3° RMS	<0.1° RMS
Output Update Rate (Navigation Data) (Hz)	400	400

Operational Readiness

1PPS time of day available (hot start)

- 60 s: 1ms accuracy to UTC
- 200 s: 1µs accuracy to UTC

Management & MonitoringUser, local:

- Power and Status LEDs on front panel
- USB: ASCII Command Line Interface
- User, remote (LAN):
- Status, configuration, event log, software update through web pages
- Machine, remote (LAN):
- SNMP v2, v3 (get, set, traps): JSON RPC

Network Security

- Password protected administration accounts
- SSL/SSH-based https, ftps protocols supported for secured access to user interface
- NTP implementation supports MD5, Autokey

Network Synchronization

- NTP v2, v3, v4: Conforms with or exceeds RFC 1305 and RFC 5905. Supports unicast, broadcast, multicast, peering, stratum 2, MD5 encryption, autokey
- PTP v1 and v2: Master and/or Slave – conforms with default profile IEEE 1588. Supports layer2/ layer 3, unicast/multicast
- VICTORY Standard compatible

Environmental

- Tested according to MIL-STD-810G
- Temperature, in operation: -40°C to +65°C (-40°F to +150°F)
- Mounting plate temperature, in storage: -45°C to +85°C (-50°F to +185°F)
- Humidity: 95% RH, non-condensing
- Altitude : 45,000 ft
- Protection: IP 65
- Vibration: 7.7 g rms, 20 to 1000 Hz
- Shock: 20 g, 11 ms, sawtooth

EMI/EMC

- Tested according to MIL-STD-461F

Physical

- Size (WxHxD): 5.8" x 2.5" x 5.0" (147.3 x 127.5 x 63.0 mm) VITA 75 compliant
- Weight: 0.91 kg (2.0 lbs)
- Mounting: On a plate, optimized for conduction cooling,
  6 through holes

Power

- Input Voltage: 10-32 V_{DC}
- Typical Power Draw: 10 W (18 W with MAC oscillator)
- Standby mode (only oscillator is powered): 0.4 W, DC power supply must be within 10.5 - 12 V_{DC}

Certification/Marking

- RoHS, WEEE compliant

Warranty

- 2 years

Ordering Options

Optional Services

- Premium Support Package (PSP)
- Yearly Warranty extension
- Long-life support package

27 September-2017 • VersaPNT Rev. C
Subject to change or improvement without notice.