VERSAPNT

Resilient Position, Navigation, and Timing in a Single Solution

Accurate in All Conditions

- Military M-code and P(Y)-code receiver, with direct acquisition and continuous tracking of both L1 and L2 GPS satellite frequencies.
- Multi-Constellation GNSS capability
- 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
- GNSS jamming/spoofing detection

Flexible

- Highly versatile with software configurable inputs/outputs
- Network sync, set-up and management
- Easy integration with small footprint and low size, weight, and power
- Compatible with external IMU's
- VICTORY interface compatible (optional)
- Low phase noise OCXO options
- High stability mini rubidium option
- Alternative Navigation option
- Future support of external hemispherical resonator gyro (HRG) technology

Compact/Rugged

- Ruggedized - MIL-STD-810G, MIL-STD-461F, IP 65
- Conduction-cooled
- Mil-performance connectors
- Configurable for multiple vehicle and airframe platforms
- Shock and vibration resistant
- Compact VITA 75 form factor

Applications

Ground
- Blue Force Tracking
- Vehicle navigation
- Mobile radios and C4ISR

Airborne
- Electronic warfare
- Flight analysis
- Tactical UAV navigation

Marine/Naval
- Sensor support (radars, sonars, optical, electronic warfare)
- Communication networks

Safran Federal Systems is the trusted Resilient PNT mission partner to U.S. government and defense organizations, from the lab to the field.

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

VersaPNT provides PNT assurance in a flexible, configurable, and scalable device that allows your PNT-reliant system to function in disrupted GNSS environments. It fuses GNSS, inertial measurement, and high-performance timing oscillators with GNSS interference detection and CRPA/AJAS antenna compatibility to provide reliable, trusted PNT in current and future GNSS threat 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. The FlexFusion® sensor fusion engine combines complementary PNT signals, meaning superior PNT accuracy without resorting to the traditional bruteforce, high-cost IMU approach. VersaPNT minimizes size, weight, power, and cost (SWaP-C) by combining PNT functions normally achieved through multiple independent subsystems, and it is ready for integration into myriad ground, air, and maritime platforms.

High Performance GPS Aided Inertial Navigation System (INS)

VersaPNT provides accurate positioning, attitude and orientation measurements, even in GNSS denied or disrupted 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 and M-Code. Future Support of external hemispherical resonator gyro (HRG) technology.

VersaPNT M-Code includes the latest generation of modernized security architecture, modernized anti-spoofing and anti-jamming for GPS-degraded environments, operations in mixed P(Y)-Code and M-Code constellations, accelerated Direct-Y and Direct-M Code acquisitions, and Over-The-Air-Rekeying (OTAR). VersaPNT M-Code provides better than 41 dB J/S while tracking (state 5) and better than 54 dB J/S (state 3) while providing cryptographic key retention without battery backup.

High-Performance Time Server

VersaPNT maintains an accurate internal timing signal via a low-phase noise OCXO, or mini rubidium oscillator, holding frequency and time accuracy for extended periods of GNSS disruption. It can also be re-synchronized by an external reference. Precise time and frequency signals are available as 1 PPS, unmodulated IRIG DCLS timecode, 10 MHz, and NMEA time-of-day messages. PTP and NTP servers provide accurate time distribution over an IP network.

Custom Solutions Available

We can customize VersaPNT to adapt to your specific requirements. Our FlexFusion engine can incorporate new external PNT sensor data, such as external high-grade IMUs, visual odometers, or alternate navigation constellations. Contact your sales representative to discuss proposals.

Reliable, Configurable, Versatile

VersaPNT incorporates a software-programmable I/O switch that allows the user to quickly configure electrical and data interfaces through a user-friendly 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, VersaPNT can accommodate an internal option board to add additional existing interfaces (such as more RS-232 ports) or new ones. 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.

Interfaces

Inputs

GNSS L1, 72 Channel Receiver (SAASM GPS L1/L2 optional)
- SMA connector, 5 VDC to GNSS antenna
- Serial data for AJAS antenna
- SAASM/M-Code adds key-load port

DCLS Configurable Inputs (TTL level, 10V)
- 1PPS
- IRIG DCLS (A, B, G, NASA-36), HaveQuick

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

Network Inputs
- NTP Stratum 2
- IEEE1588 v2 Slave

External IMU
- Serial data input

Outputs

DCLS Configurable (up to 4x TTL outputs, 1x 10 V output)
- 1PPS, any pulse up to 10 MHz
- IRIG DCLS (A, B, E, G, NASA-36), HaveQuick

RS232 and RS485
- NMEA 0183 time and position messages
- HaveQuick

Frequency
- 10 MHz, sine, +0 dBm, SMA connector

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

Navigation Performance

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

Performance	
Receiver Type	GPS, SAASM, M-Code
IMU Sensor Type	Internal MEMS (Tactical Grade)
Position Accuracy (Horizontal)	2.5 m RMS (GPS L1)
Position Accuracy (Vertical)	5.0 m RMS (GPS L1)
Gyro in-Run Bias Stability	<1º/hr
Velocity Accuracy	±0.05 m/s
Roll & Pitch Accuracy (Dynamic)	<0.03º RMS
Heading Accuracy (Dynamic)	<0.2º RMS (with GPS) <0.3º RMS (without GPS)
Output Update Rate (Navigation Data) (Hz)	400

Operational Readiness
1PPS time of day available (hot start)
- 60 s: 1ms accuracy to UTC
- 200 s: 1μs accuracy to UTC

Additional GNSS protection
GNSS spoofing/jamming detection (optional)
AJAS antenna-compatible (obtained separately)

M-Code Features
- Connector: SMA, +5V to power active antenna
- Receiver input: L1/L2
- Crypto Key input: DS-101 key loading. Front panel connector
- Security: M-Code (MPE-M) MGUE
- Antenna/preamplifier: L1 1574.42 MHz & L2 1227.60 MHz, 40 dB gain (antenna sold separately)
- Acquisition time: TTFF (95%): <15 sec hot start, <90 sec warm start
- Purchases and Export of VersaPNT M-Code requires coordination through the SMC Production Corps.

Management & Monitoring
User, 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, remove (LAN):
- SNMP v2, v3 (get, set, traps)
- JSON RPC

Timing and Frequency Performance

Performances	OCXO**	OCXO High Perf	mRO-50
Timebase Performances			

Relative Frequency Variation with Aging:
  - 24 hours
  - One month
  - One year
	5×10^{-10}
	1×10^{-8}
	5×10^{-8}
		2×10^{-10}
		4×10^{-9}
		2×10^{-8}
			–
			1×10^{-10}
			1×10^{-9}

Relative Frequency Variation with Temperature	$\pm 5 \times 10^{-8}$ (-40ºC to 65ºC)		4×10^{-8} (-10ºC to 65ºC)

Short Term Stability (Allan Deviation):
  @ 1 s
  @ 10 s
  @ 100 s
	1×10^{-9}
	1×10^{-10}
	3×10^{-11}
			3×10^{-10}
			5×10^{-11}
			3×10^{-11}

Phase Noise on 10 MHz Output:
  @ 10 Hz
  @ 100 Hz
  @ 1 kHz
  @ 100 kHz
	-120 dBc/Hz
	-140 dBc/Hz
	-150 dBc/Hz
	-155 dBc/Hz
			-90 dBc/Hz
			-110 dBc/Hz
			-135 dBc/Hz
			-140 dBc/Hz

Harmonic Distortion	-40 dBc		
Spurious	-40 dBc		
System Performance*			
Frequency Accuracy Averaged Over 24 hour when Locked on GNSS	5×10^{-12}	2×10^{-12}	1×10^{-12}

Phase (1 PPS) Drift in Holdover (no reference available)
  - 4 hours
  - 24 hours
  - 7 days
	3 μs
	40 μs
	1.2 ms
		2.8 μs
		30 μs
		0.6 ms
			0.2 μs
			1.5 μs
			20 μs

Phase (1 PPS) Accuracy to UTC	±50 ns		

** A Rugged, Low Phase Noise OCXO option is available for high-vibration environments such as aircraft and maritime. Contact Safran for details.

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 – conforms with default profile IEEE 1588. Supports layer2/layer 3, unicast/multicast
- VICTORY Interface compatible (optional)

Environmental

- Tested to MIL-STD-810G CH1
- Temperature, in operation: -40ºC to +71ºC with OCXO (-10ºC to +45ºC with mRO-50)
- Mounting plate temperature, in storage: -45ºC to +85ºC
- Humidity: 95% RH, non-condensing
- Altitude: 45,000 ft
- Environmental Protection: IP 65
- Vibration MIL-STD-810G CH1 Method 514.7, Categories 12,13,14,20,21,24
- 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 63.0mm) VITA 75 compliant
- Weight: 1.0 kg (2.2 lbs)
- Mounting: On a plate, optimized for conduction cooling, 6 through holes

Power

- Input Voltage: 10-32 VDC
- Typical Power Draw: <25 W (with OCXO)
- Standby mode (only oscillator is powered): 0.4 W, DC power supply must be within 10 - 32 VDC

Certification/Marking

- RoHS, WEEE compliant

Warranty

- 2 years

Service Options

Optional Services

- Yearly Warranty extension

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