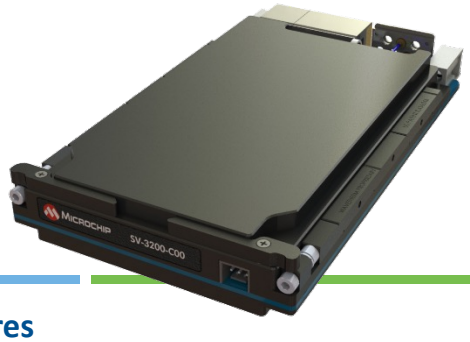
SV-3200 PNT Source Card



Summary

The SV-3200 PNT source card, developed in alignment with the Sensor Open Systems Architecture® (SOSA®) Technical Standard, is a payload slot-compatible plug-in card used to host PNT sensors within a SOSA chassis. This card can be equipped with components such as an M-Code or civilian GNSS receiver, a Miniature Atomic Clock (MAC) or a tactical-grade Inertial Measurement Unit (IMU) and a magnetometer. The PNT source card timestamps PNT sensor data with picosecond-level accuracy and wraps the data into the All-Source Positioning and Navigation (ASPN) message format for easy fusion and distribution.

Key Features

- SOSA aligned
- 3U VPX form factor
- Quad-core Arm® Cortex® processor with embedded Linux® Operating System
- PolarFire® FPGA
- ASPN 2023 integration
- 1 PPS and 100 MHz coaxial outputs (P2 aperture)

PNT Source Options

- Civilian GNSS or M-Code GPS receiver
- Rubidium MAC frequency reference or IMU
- Magnetometer
- External PNT reference inputs
- pntOS sensor fusion software

Payload by Design

The SV-3200 PNT source card was specifically chosen as a payload slot card to provide flexibility and modularity of PNT sources within a SOSA chassis. The PNT source card enables operators to mix and match relevant PNT sources for their mission with several payload cards rather than forcing all the sensors to fit onto one radial clock card. An example of the benefit of this approach is if new sensors, such as a Next-Generation Atomic Clock (NGAC), quantum or ALTNAV sensors, become necessary to have on a platform to achieve resilience. It would be difficult to fit all those sensors into one radial clock slot card, and as new sensors become available, vendors would need to re-spin their radial clock cards to incorporate these new sensors, which is a long and costly effort. The PNT Source Card is aimed to create a flexible solution for this exact purpose. Ultimately, this approach allows new technology to be fielded to the warfighter faster, enables more flexible operation and improves the warfighter's ability to react to dynamic environments and evolving mission requirements.

PNT Source Options

The PNT source card offers several different configurations of PNT sources on the card to support a decentralized PNT architecture.

- MAC or IMU
- GNSS or M-Code receiver
- Magnetometer

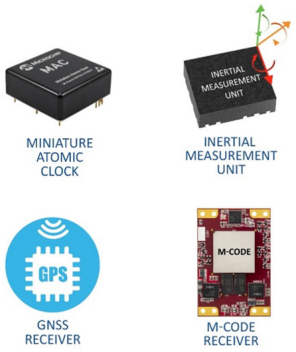
GNSS/M-Code Receiver

The PNT source card has several configurations that include an M-Code receiver or a GNSS receiver.

The GNSS receiver offers high position availability with multi-constellation, multi-frequency tracking; spoofing detection; interference detection and mitigation. The receiver also features configurable channels to optimize satellite availability in any condition, no matter how challenging.

The M-Code receiver can receive existing operational GPS signals and M-Code signals. Features include aggressive acquisition and reacquisition strategies to improve performance and reduce power consumption. The receiver can monitor up to 24 satellites and choose the best position.

Inertial Measurement unit



The IMU is a tactical-grade, low-weight and high-performance unit. It contains three very accurate Micro-Electro-Mechanical System (MEMS) gyros, three high-stability accelerometers and three inclinometers to provide nine degrees of freedom measurements. The IMU also has a customer-configurable output format, sampling rate and filter settings

Miniature Atomic Clock (MAC)

The MAC rubidium frequency reference enables the PNT source card to be a system reference with excellent holdover during periods of GNSS denial. The internal MAC uses a unique physics package based on the Coherent Population Trapping (CPT) atomic clock. It consumes less power and has broad temperature operation and longer life than legacy, lamp-based rubidium clocks.

Stability

ADEV	SA55 (Hz/Hz)	SA53 (Hz/Hz)
τ = 1 s	$< 1.5 \times 10^{-11}$	$< 3 \times 10^{-11}$
τ = 10 s	$< 5 \times 10^{-12}$	$< 1 \times 10^{-11}$
τ = 100 s	$< 1.5 \times 10^{-12}$	$< 3 \times 10^{-12}$
τ = 1,000 s	$< 5 \times 10^{-13}$	$< 1 \times 10^{-12}$
τ = 10,000 s	$< 1.5 \times 10^{-12}$	$< 3 \times 10^{-12}$
Frequency Drift	**SA55 (Hz/Hz)**	**SA53 (Hz/Hz)**
Monthly[3]	$< 5 \times 10^{-11}$	$< 1 \times 10^{-10}$
Yearly	$< 6 \times 10^{-10}$	$< 1.5 \times 10^{-9}$
Daily[4]	$< 2.5 \times 10^{-11}$	$< 2.5 \times 10^{-11}$

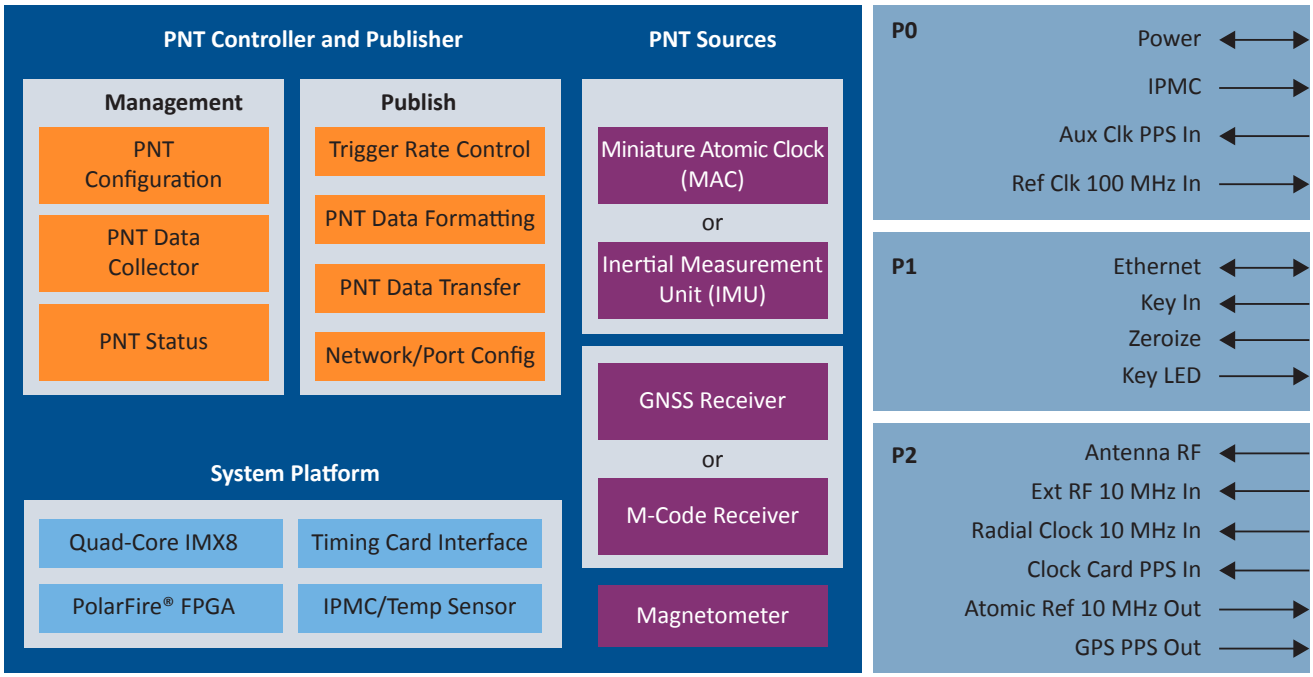
[3]After 1 month of continuous operation
[4]After 1 day of continuous operation

Ordering Options

We offer the PNT source card in five configurations to meet the specific needs of our customers. The table below outlines the different options.

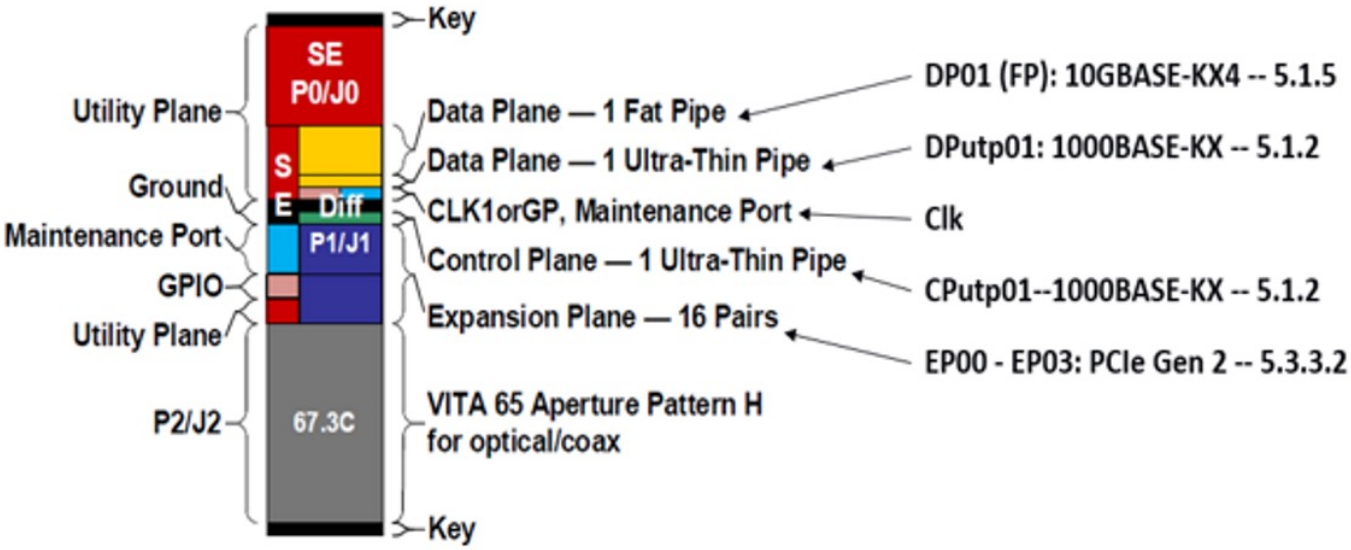
Part Number	Description
SV-3200-C00	MAC-D reference, conduction-cooled RF payload card for 3U chassis
SV-3201-C00-M00	MAC-D and M-Code references, conduction-cooled RF payload card for 3U chassis
SV-3202-C00	MAC-D and GPS references, conduction-cooled RF payload card for 3U chassis
SV-3203-C00-M00	IMU and M-Code references, conduction-cooled RF payload card for 3U chassis
SV-3204-C00	IMU and GPS references, conduction-cooled RF payload card for 3U chassis

Card Functional Block Diagram



PNT Source Card Slot Profile and P2 Connector Layout

The PNT source card is designed to work with standard chassis or backplanes that are developed in alignment with the SOSA Technical Standard.



"Technical Standard for SOSA™ Reference Architecture, Edition 2.0 (Snapshot 2)" by The Open Group