

VPX Timing Clock

Ruggedized Timing Solution for VPX Backplanes



The VPX Timing Clock offers a complete solution set for all PNT needs. This highly ruggedized conduction cooled unit provides a versatile multifunction clock references for any environment.

This fully-defined, backplane-centric VPX module optionally supports either commercial GNSS receivers (i.e. U-Blox), or secure SAASM M-Code GPS receiver data along with external 1PPS UTC rollover references, reference clocks of up to 100MHz, as well as Amplitude Modulated (AM) or DC Level Shifted AM (DCLS) IRIG inputs as means of synchronization via the VITA 67.3C backplane RF connector.

The VPX Timing Clock also provides two (2) 1000BASE-KX Ethernet ports by default, with optional software upgrade to a much faster 10GBASE-KR.

The module provides NTP functionality (RFC 5905) with both server and client capabilities, and optional support for PTP (IEEE 1588-2008).

In its default configuration, the VPX Time Clock employs a highly stable VCXO to serve the backplane with multiple (11+11) coherent disciplined clocks aligned with PPS pairs.

These radial clocks have a maximum group skew of ± 25 picosecond between pairs, while the PPS inputs to outputs phase alignment is maintained within ± 10 ns. Furthermore, each clock phase can be further tuned within ± 25 picoseconds to calibrate for module radial clock routing.

The module can be optionally configured with an HSOCXO or CSAC to further enhanced holdover accuracy while operating in reference-deprived environments. As an added feature the raw GNSS data can be logged or distributed via multicast from the module for downstream processing.

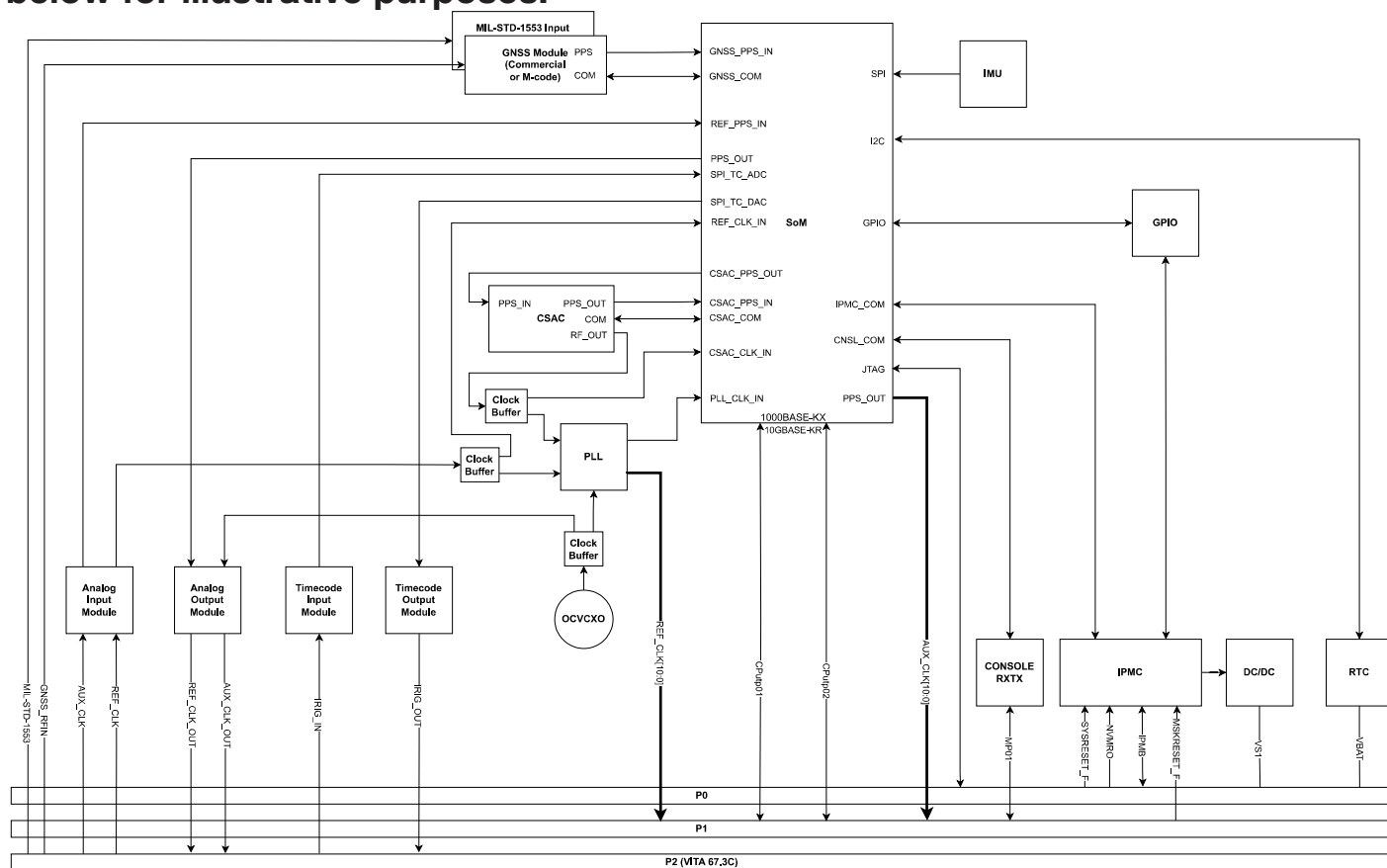
To facilitate a higher level of integration, selected 3rd party Linux applications can also be installed on the file-system for concurrent execution with the system main software.

The module provides a comprehensive Health and Management monitoring system alongside status and configuration of the module via gRPC over HTTP via Ethernet or for RS-232 console access.

FEATURES

- **SOSA Aligned**
- **3U VPX Form Factor**
- **Low SWAP applications**
- **Ruggedization Level 200**
- **Provides low noise reference using Chip Scale Atomic Clock (CSAC)**
- **Optional SAASM GPS available with RS232 key-fill connectivity**
- **11 Radial Clock Outputs**
- **Programmable 3GHz outputs**
- **OpenVPX Backplane support for 1000BASE-KX, 10GBASE-KR, or PCIe**

To illustrate the functionality of the VPX Timing Card, a Block Diagram is provided below for illustrative purposes:



Specifications

Input Specifications

1PPS stability to GPS time	$\pm 53\text{ns}$
1PPS stability to UTC time	$\pm 200\text{ns}$
Frequency Stability (CSAC)	3×10^{-10}
Phase Accuracy, 100MHz to 1PPS	$\pm 10\text{ns}$
Holdover	$\pm 26\mu\text{s}$ over 24 hours
Long Term Oscillator Aging without GPS	Aging, monthly: $<3 \times 10^{-10}$ Aging, yearly: $<1 \times 10^{-9}$
Serial Controls to CSAC, SAASM GPS (optional) SAASM Key-Zeroize	3.3V CMOS CMOS RS232 message to SAASM GPS
GNSS Antenna	Active 3.3V Antenna, L1 and L2, Maxantenna
GPS Receiver – SAASM/Mcode GPS (optional)	12 channels, L1 and L2, SAASM, DS101 Key and zeroize

Output Specifications

VITA 67.3C Connector Output	10/100 MHz RF
Backplane Radial Clocks	11 Individually programmable output clocks
Backplane Radial Output Clock Frequency Range	3-3000 MHz
1PPS output	LVDS, 1.125 to 1.375 offset, V_{OD} 250-450mV
100MHz output	LVDS, 1.125 to 1.375 offset, V_{OD} 250-450mV

SOSA Profile Support

SOSA Profile:	SLT3x-TIM-2S1U22S1U2U1H-14.9.2-1
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Power

Warm Up Time -	<4 minutes
Power Consumption	Typ: 10.9W Max: 11.6W
With SAASM GPS	Typ: 11.4W Max: 12.1W

Environmental

Operating Temperature	-40°C to +85°C
G-sensitivity	MIL-STD-810, Method 514.6, Figure 514.6E-1, 7.7 g_{RMS} , (General Minimum Integrity Exposure)

Physical

Size	3U VPX CC 172 mm L x 100 mm W x 24.8 mm H (6.77" L x 4" W x 1" D)
Weight	510g (1.125 lbs.) (Weight subject to change depending on installed options)