

T220-V VPX Timing Card

3U VPX design, NTP/B, PPS, and TOD synchronization

In embedded computing, communication control, synchronous data acquisition, and critical mission systems, a continuous and unified time reference serves as a critical foundation for ensuring correct event ordering and coordinated operation. External timing devices often fail to meet the compactness requirements of the VPX platform in terms of spatial layout, cabling, and system integration. The T220-V VPX timing card is a plug-in synchronous solution designed for high-reliability embedded systems. Featuring a fully enclosed 3U VPX architecture, it can be integrated into a VPX chassis, utilizing GPS/Beidou satellite signals as its time reference to provide precise timing for computing platforms and associated devices.

The T220-V integrated GNSS receiver and high-stability temperature-stabilized crystal oscillator can output time signals including NTP, 1PPS, TOD, and B-DC, meeting the synchronization requirements of terminals, control devices, and data acquisition modules. In the event of satellite reference anomalies or interruptions, the onboard crystal oscillator can enter a time-keeping mode to maintain temporal continuity, thereby reducing the risk of data misordering and service interruptions caused by loss of time reference. This product combines high integration, environmental adaptability, and reliability, making it suitable for applications in industrial automation, communications, power systems, radio navigation and monitoring, synchronized data acquisition, and precision time and frequency comparison.



our advantages

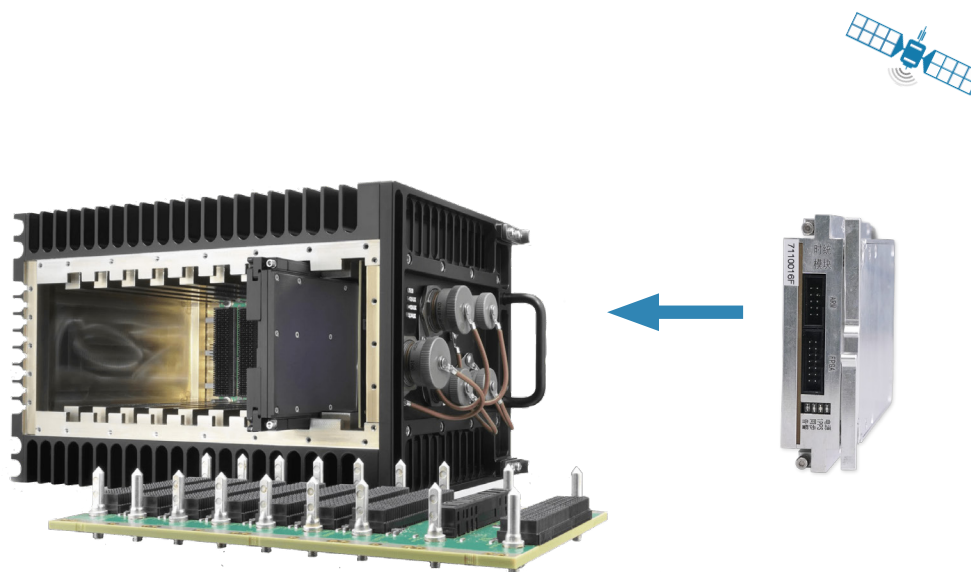
- ✓ **Fully enclosed 3U VPX architecture**
Designed for high-reliability embedded computing platforms, it integrates directly into a VPX chassis, featuring a compact form factor and strong environmental adaptability.
- ✓ **High-precision GNSS satellite timing**
Supports dual-mode timing via GPS and BeiDou, as well as L1 and B1 frequency bands, providing the system with a time reference with an accuracy better than 30 ns.
- ✓ **Extensive time synchronization outputs**
Integrates NTP, 1PPS, TOD, and B-DC outputs to provide unified time synchronization for both network terminals and hardware devices.
- ✓ **High reliability and punctuality**
Equipped with a built-in high-stability temperature-stabilized crystal oscillator, ensuring continuous and stable time output even when the satellite reference fails or is interrupted.
- ✓ **High-performance NTP time service**
Supports NTP versions 1–4, SNTP, and MD5 encryption, meeting the requirements for network time synchronization across multiple terminals under high concurrency conditions.
- ✓ **Industrial-grade environmental adaptability**
Featuring VPX slot power supply and a wide-temperature design, this solution is suitable for demanding applications in industrial control, communications, power systems, and synchronous data acquisition.

Key Features • GPS/Beidou satellite timing • Integrated NTP time server • Output: 1PPS, TOD, and B-DC • Features a built-in OCXO and supports local timekeeping.	VPXstructure • Fully enclosed 3U VPX board • VPX slot: 12 VDC power supply • Compatible with embedded computing platforms • Compact integration reduces external wiring.	NTP Time Synchronization • 1 x 100/1000Base-T interface • NTP V1–V4, SNTP, and MD5 • Timekeeping accuracy ≤ 2 ms • Service performance $\geq 10,000$ ops/s
Time synchronization output • 1PPS: RS422, accuracy ≤ 30 ns • TOD: RS422, supports NMEA 0183 • B-DC: RS422, Standard B-code format • 1PPS and B-DC support phase adjustment.	GNSSReceiver • Supports GPS L1 and BeiDou B1 frequency bands • Timekeeping accuracy exceeds 30 ns RMS • Capture time ≤ 2 minutes • SMA 50Ω antenna interface	Punctuality and Environment • OCXO stability $\leq 5 \times 10^{-11}/s$ • Upon satellite failure, it automatically enters a time-keeping state. • Operating temperature: -40°C to $+60^{\circ}\text{C}$ • Storage temperature: -40°C to $+80^{\circ}\text{C}$

Application in networks

VPX Time-Stamping Card

- It can be directly integrated into a 3U VPX chassis, providing a stable and reliable unified time reference for embedded computing platforms, task processing systems, and control devices.
- Achieve precise synchronization between the host and associated devices in fields such as industrial automation, communications, power systems, radio navigation/monitoring, synchronous broadcasting, and synchronous data acquisition.
- Provide timing for network terminals and business systems via NTP, and distribute time and phase signals to external modules through 1PPS, TOD, and B-DC.
- The fully enclosed VPX architecture eliminates the need for standalone timing devices and complex cabling, making it ideal for high-density, high-reliability embedded system integration. Equipped with a high-stability temperature-compensated crystal oscillator, the system automatically enters time-keeping mode during GPS/Beidou reference signal interruptions, ensuring continuous and accurate system time operation.



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Should there be any changes to the product specifications, Nu will not provide separate notice.

timekeeping performance

	Clock	Aging / Day 30	Temperature stability
Standard OCXO	Standard punctual type	$\pm 5 \times 10^{-10}$	$\pm 50 \times 10^{-10}$
Ultra-high stability DOCXO	High-stability environment type	$\pm 5 \times 10^{-11}$	$\pm 1 \times 10^{-11}$
Rubidium atomic clock	Punctual type	$\pm 8 \times 10^{-12}$	$\pm 5 \times 10^{-10}$

* Note: Effective daily aging is conducted one month after the equipment is energized.

	200nsec	400nsec	1.1usec	1.5usec	5usec	10usec	16ppb
StandardOCXO	1 hours	2 hours	4 hours	5 hours	8 hours	1 days	1 month
Ultra-high stability DOCXO	5.5 hours	8.5hours	15 hours	18 hours	1.4 days	2 days	10 month
Rubidium atomic clock	12 hours	1days	3days	4days	8days	10days	5 years

* Note: The above values represent typical values (1 σ confidence level) assuming a controlled temperature environment after the device has been powered on and GNSS72 locked for 1 hour. Due to the superior temperature stability of the High-Stability Environment Model, when significant temperature fluctuations occur, the retention rate of the High-Stability Environment Model will exceed that of the rubidium clock.

NTP serve

- The smallest NTP server
- NTP server with hardware-based security
- GNSS reference Tier-1 time server
- NTP v1, v2, v3, v4, and SNTP IPv4/IPv6
- Time & Date Agreement
- NTP responder with hardware-based DoS protection
- Up to 10,000 responses per second
- Supports both PTP and NTP services on the same port

GNSSreceiver

- Supports single-mode, dual-mode, and multi-mode operation with BDS/GPS (including QZSS), GLONASS, and GALILEO; defaults to dual-mode operation with BDS+GPS.
- Supports BDS B1I+B1C+B2a, GPS/QZSS L1+L5, GLO L1, and GAL E1+E5 frequency bands.
- Supports AGNSS-assisted positioning
- Features interference detection and alert functionality.
- Positioning accuracy: horizontal <2 m; vertical <3 m
- Cold start: 30s; Hot start: 2s;
Recapture: 1s; Timing accuracy: <20 ns

External antenna

- Users can configure antenna cable delay compensation.
- Antenna voltage: +3.3 VDC
- Antenna connector: SMA-F (50 Ω)

1 PPS pulse

- Route: Route 1
- Interface: RS422
- Timekeeping accuracy: ≤ 30 ns (RMS)
- Pulse width: 1 μ s–999 ms; configurable
- Phase offset: -1024~1023 ns, configurable

TOD output

- Route: Route 1
- Interface: RS422
- Frame Format: NMEA0183, ZDA sentence
- Port rate: 9600/115200, configurable

B-DC output

- Route: Route 1;
- Interface: RS422;
- Frame format: IEEE Std 1344-1995/GJB 2991A-2008 compliant
- Configurable;
Time zone: The time zone can be set from -12 to +12;
Phase offset: -1024~1023 ns, configurable.

Physical and environmental parameters

- Power supply: 12VDC, powered via the VPX slot;
- Humidity: 95%; no condensation;
- Dimensions: 3U VPX, custom;
- Operating temperature: -40 °C to +60 °C;
- Storage temperature: -40 °C to +80 °C