

## Product Overview

The VCL-2424, Pole Mount Primary Reference Clock (PRC) and IEEE-1588v2 PTP Grandmaster is a ruggedized GNSS (GPS/GLONASS) synchronized, ITU-T G.811 compliant Primary Reference and IEEE-1588v2 PTP Grandmaster Clock that designed to be installed 2G, 3G and LTE service providers in harsh, un-protected, outdoor environments, such as to mobile cell towers, to provide a highly precise time and frequency reference to provide ITU-T G.811 compliant primary reference frequency output and a time of day reference.

It may be also used by railways and metro signaling infrastructure, airports and air-traffic control facilities, solar farms, wind-farms, electric sub-stations, power distribution infrastructure, off-shore oil and gas rigs and naval vessels that are required to operate in complete isolation due to the very nature of their application, geographical location, or due to security reasons.

### Features and Highlights:

- ITU-T G.811 compliant 2.048MHz and 10MHz frequency outputs
- IEEE-1588v2 PTP Grandmaster
- <100ns Accuracy when locked with GNSS (GPS/GLONASS)
- Rugged Construction, IP65 Polycarbonate, corrosion resistant outdoor enclosure
- Standard PTP Profiles supported: Default, Telecom, Power, SMPTE, Telecom2 and Power2
- High bandwidth NTP performance. Supports up to 3000 NTP requests per second
- Synchronization of NTP and SNTP clients
- Supports Unicast, Multicast and Broadcast
- Leap Second Correction Support
- MD5 authentication for NTP clients
- Meets and comply with Power Contact and Lightning Protection as per Telcordia GR-1089-CORE and EN61000-4-5 Level 4 specifications.
- Alert notifications via SNMP Traps
- Concurrent IPv6 and IPv4 operation
- Supported networking protocols: IPv4, IPv6, SSH, FTP, SYSLOG, SNMPv2 and TELNET
- Double Oven Quartz Oscillators (OCXO) hold-over
- Automatic and continuous OCXO Calibration from GPS reference
- Stratum 1 when synchronized to GPS/GNSS, or Stratum 2 hold-over
- 12VDC, 24VDC and 48VDC Power Supply options.

The VCL-2424 is equipped with a highly accurate, low-noise OCXO to provide a high stability, ITU-T G.812, Type II, III compliant holdover clock with better than 12 $\mu$ s accuracy over a 24-hour (5 milliseconds per year) period in the event of unavailability of the GNSS (GPS/GLONASS) signal, or GNSS (GPS/GLONASS) antenna failure, or a temporary loss of reception occurring due to stormy weather conditions or solar flares or without any external reference.

VCL-2424 establishes a highly accurate phase-synchronized frequency and time base by synchronizing to the GNSS (GPS/GLONASS) satellites' atomic clocks to distribute synchronized time over packet based networks including Ethernet, Carrier Ethernet, IP and IP/MPLS Networks.

The VCL-2424 provides a wide range of GNSS (GPS/GLONASS) referenced frequency and time sources (outputs) that include 2.048MHz, 10MHz, 1PPS as well as an NMEA, 1588v2 PTP and an NTPv4 time reference. Features such as maintaining a distinctly separate IP address for system management and control, password based access, SSH as well as MD5 authentication ensures operational reliability and security. Additional features include remote login and remote firmware upgrade (file transfer) capabilities. VCL-2424 includes complete SNMP monitoring as well as support for enterprise directory services for user authentication, internal and external logging and monitoring of alarm and error messages through Syslog ensures a high level of system manageability. Other features includes support concurrent IPv4/IPv6 support for future network upgradation.



### Performance:

VCL-2424 is powered by a high-performance microprocessor and a highly precise GNSS (GPS/GLONASS) based time receiver that provides a better than 30 nanosecond accuracy.

VCL-2424 is designed to provide NTP and PTP time and frequency synchronization, with separate individual ports for each type of service.

The VCL-2424 meets and complies with "Power Contact and Lightning Protection" as per Telcordia GR-1089-CORE and EN61000-4-5 Level 4 specifications making it suitable for the equipment to be installed in harsh industrial environments.

### Monitoring and Management:

The configuration of the system can be managed by Graphical User Management Interface. Alternatively, a text based and menu driven setup utility can be started from the shell prompt after logging into the unit via Telnet or SSH. An optional Graphical User Network Management Interface (NMS) allows multiple systems to be monitored and configured from single or multiple management locations.

### Standards & Compliance:

- IEC - EMC Certified to EN 55022: 2005 / CISPR 22, EN 55024:2005, IEC 61000-4-2
- CE 2001/95/EC, 2006/95/EC, EN60950-1, EN61000-6-2, EN61000-6-4
- FCC FCC Part 15 B Class A: Conducted Emission test on Power Line
- FCC Part 15 B Class A: Radiated Emission >1GHz FCC, 6GHz, on Power Line

**Technical Specifications:****GPS/GNSS Receiver Specifications:**

- 50 Channel GPS Receiver
- 72 Channel GNSS Receiver
- GPS L1 frequency, C/A Code Receiver
- Tracks up to 12 satellites simultaneously
- Synchronizing Time:
  - Acquisition time - Hot Start: Less than 15 sec.
  - Acquisition time - Warm Start: Less than 45 sec.
  - Acquisition time - Cold Start: Less than 140 sec.
- GPS Signal
  - Tracking and Navigation: -162 dBm
  - Reacquisition -160 dBm
  - Cold Start -148 dBm
- Integrated GPS Antenna
- Accuracy of Time-Pulse Signal referenced to GPS: +/-30ns (raw), in Stationary Mode
- Accuracy of Time-Pulse Signal referenced to GNSS: +/-20ns (raw) in Stationary Mode
- Accuracy of Time-Pulse Signal referenced to GPS/GNSS: +/-15ns (compensated) (Note: with all satellites in view at -130db)
- User configurable for “Stationary” or “Moving” Applications. May be configured for use in Portable, Automobile, Maritime Application Modes.

**Holdover (G.812) Synchronization:**

- OCXO (Double Oven-Controlled Crystal Oscillator)

**Synchronization Inputs:**

- 1 x GPS

**Network Time Protocol:**

- NTP v2, (RFC 1119), NTP v3 (RFC 1305), NTP v4, (RFC 5905), SNTP v3 (RFC 1769), SNTP v4 (RFP 2030), MD5 Authentication
- Internet Protocol: IPv4/IPv6
- Time Protocol: TIME (RFC 868)
- Daytime Protocol: DAYTIME (RFC 867)
- Supports Unicast, Multicast and Broadcast

**Ordering Information:**

Part Number	Description	Power
VCL-2424-NTP-YY	ITU-T G.811 Primary Reference Clock and NTP Server	YY = Specify DC Voltage: 12VDC / 24VDC / 48VDC
VCL-2424-NTP-PTP-YY	ITU-T G.811 Primary Reference Clock, IEEE-1588v2 PTP Grandmaster and NTP Server	YY = Specify DC Voltage: 12VDC / 24VDC / 48VDC

Technical specifications are subjects to changes without notice.

**Frequency Outputs:**

- 1 x 2.048 MHz, 75 Ohms, phase-locked
- 1 x 10 MHz, 50 Ohms, phase-locked
- 1 x 1 PPS, phase-locked to UTC (BNC)

**PTP IEEE 1588-2008 V2 Grandmaster:**

- <100ns Accuracy when locked with GNSS (GPS/GLONASS) in Stationary Mode.
- PTP Slave/Client capacity: 8, 16, 32
- User Configurable: 1-step and 2-step Clock

**PTP Outputs:**

- 1 x 10/100/1000Base-T (RJ45) Electrical Port.

**PTP Profiles:**

- Default IEEE-1588v2, 2008 PTP Profile
- Default Power Profile.
- Power Profile: IEEE C37.238-2011
- Ethernet Default Profile (Layer 2 multicast)
- Telecom-2008 Profile (Layer 3 unicast, pre-standard ITU-T G.8265.1, Ipv4)
- ITU-T G.8265.1 (Layer 3 unicast, Ipv4)
- Communication: Unicast, Multicast or Mixed
- Best Master Clock Algorithm (BMCA)

**NTP Output:**

- 1 x 10/100 Mbps user configurable NTP interface

**Local / Remote Management and Monitoring Ports:**

- 10/100BaseT Ethernet RJ45

**Local / Remote Communication Options:**

- Telnet / SSH (With option to disable clear text communication to comply with NERC security requirements)
- CLI Control Interface (HyperTerminal or VT100)
- SNMP V2 Traps (MIB File provided).
- Syslog

**Security and Protection:**

- Password Protection with password strength monitor
- SSH

**Configuration and Monitoring Software:**

- Telnet, SSH, CLI
- NMS - GUI (Graphical User Interface) - Runs on any PC operating on Windows 7, Windows 8 or Windows 10 OS.

**Environmental (Equipment):**

Operational:	-40C to +75C (Typical: +25C)
Cold start	-20C to +50C
Storage	-40C to +85C (Typical: +25C)
Humidity	95% non-condensing
Enclosure	IP65, suitable for outdoor, unprotected installation.

**Mechanical Specifications:**

Height	102 mm
Width	289 mm
Depth	190 mm
Weight	1.9 Kg

**Power Supply Options:**

- DC 12V
- DC 24V
- DC 48V

**Power Consumption:**

- < 10W at ambient (steady state 24°C)

**Antenna Specifications:**

- Integrated Antenna
- Antenna Type: Active
- Amplifier Gain: Typical 27dB (GPS L1 band)
- Operating temperature: -40C to +75C
- Reverse Polarity Protection
- Lightning Protection: According to EN61000-4-5 Level 4.

**MTBF:**

- Per MIL-HDBK-217F: ≥ 17 years @ 24C
- Per Telcordia SSR 332, Issue 1: ≥ 23 years @ 24C

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