

VCL-2145-LC GPS Primary Reference Clock

Introduction:

VCL-2145-LC (VCL-GPS-2145), GPS Primary Reference Clock is a high precision frequency synchronization solution which may be used to provide ITU-T, G.811 Primary Reference Clocks which are referenced to a GPS source.

The VCL-2145-LC (VCL-GPS-2145), GPS Primary Reference (PRC) Clock is specifically designed for frequency synchronization of 2G, 3G, HetNet and LTE mobile telecommunications networks as well as backhaul wire-line SDH / SONET and Synchronous Ethernet networks. It may be also used by Railways, Airports (and air-traffic control), Power generation and distribution companies and other Utility companies who require a highly precise G.811 frequency synchronization locked to a GPS Reference.

The VCL-2145-LC (VCL-GPS-2145) locks to a GPS reference to provide multiple G.811 / Stratum 1 quality frequency outputs. The VCL-2145-LC is also equipped highly accurate, low-noise OCXO / Rubidium oscillator which provides a high stability, ITU-T G.812 compliant holdover clock that is typical of a Network SSU in the event of unavailability of the GPS signal, or GPS antenna failure.



Features and Highlights:

- Reliable, Cost-Efficient Reference GPS Receiver
- 50 Channel GPS, L1 frequency, C/A Code Receiver
- Simultaneous tracking of up to 12 GPS satellites
- ITU-T G.811 Primary Reference (PRC) Clock
- GPS locked G.703 compliant E1, 2.048 MBits, 1.544 MBits and 2.048 MHz outputs
- Primary reference and holdover functionality:
 - ITU-T G.811 / Stratum 1 compliant (PR) Primary Reference when locked to GPS
 - ITU-T G.812 compliant holdover
- SSM Message format Compliant with ITU-T G.704. Optional GR-378-CORE for SONET Networks
- 1/5/10 MHz output
- 2Mhz and 2Mbps Primary Reference Clock outputs
- 1 PPS outputs
- Standard RJ45 and BNC connectors for all inputs and outputs
- ToD compliant to NMEA 0183 (DB9 Serial Port).

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 >1 GHz
FCC, 6 GHz, on Power Line

Additional Features:

- Telnet, SNMP V2 MIB, Password Protection
- Redundant AC and DC power supply options
- Power Contact and Lightening Protection as per Telcordia GR-1089-CORE.

Available Version:

GPS, Primary Reference Clock

- **Product:** VCL-2145-LC (VCL-GPS-2145,)GPS Primary Reference (PRC) Clock

Description:

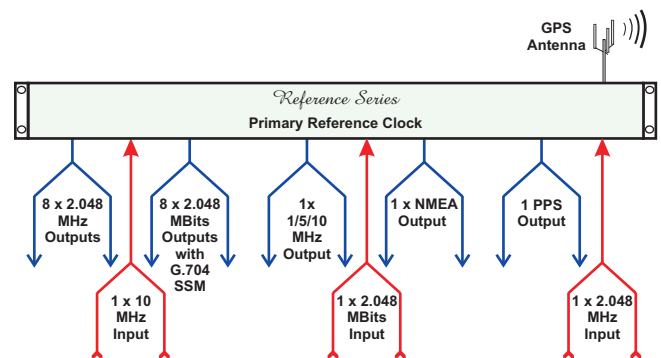
(i) VCL-2145-LC, GPS Primary Reference (PRC) G.811 Clock. Provides 1PPS, NMEA, 1/5/10MHz, 2.048MHz, 2.048Mbits with SSM, 1.544Mbits Frequency Outputs with High Stability OCXO (G.812) Holdover.

(ii) VCL-2145-LC, GPS Primary Reference (PRC) G.811 Clock. Provides 1PPS, NMEA, 1/5/10MHz, 2.048MHz, 2.048Mbits with SSM, 1.544Mbits Frequency Outputs with Ultra-High Stability Rubidium (G.812) Holdover.

Typical Synchronization Applications:

- Synchronizing Cellular networks like UMTS, GPRS, 3G and LTE
- Power generation and distribution companies and other utility companies
- Wireless and Wireline Telecom synchronization
- Synchronization of Defense Networks
- Synchronizing airports and aviation communications
- Synchronizing railway signaling networks and railway communications
- Broadcasting Network and Broadcast equipment synchronization.

Application Diagram:



GPS Receiver as a Primary Reference (PRC) Clock

Technical Specifications

GPS Receiver:

- 50 Channel GPS 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
- Antenna Connector: TNC
- Accuracy Of Time-Pulse Signal referenced to GPS: +/-30ns (raw)
- Accuracy Of Time-Pulse Signal referenced to GPS: +/-15ns (compensated)
 (Note: with all satellites in view at -130db)

Internal (G.812) Synchronization Options:

- Rubidium
- OCXO (Oven-Controlled Crystal Oscillator)

Management and Monitoring Ports:

- RS-232C
- USB
- 10/100BaseT Ethernet - RJ-45
- 2 x External Alarm Relay Contacts.

System Access, Control and Management Options:

- Telnet
- CLI Control Interface (HyperTerminal or VT100)
- SNMP V2 Traps (MIB File provided)

Security and Protection:

- Password Protection

Configuration and Monitoring Software:

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

Power Supply Options:

- Dual Redundant
- 1+1 AC power (100 to 240V AC, 50/60 Hz)
- 1+1 DC 24V power
- 1+1 DC -48V power
- 1+1 DC 110/125V DC power
- AC or DC

Standard Frequency and ToD* Outputs:

| Output Type | Number Of Outputs | Connector |
|--|-------------------|--------------|
| 2.048 Mbit/s (E1) / 1.544 Mbit/s (T1) compliant with ITU-T G.703 | 8 (8E1 or 8T1) | RJ45 |
| 2.048 MHz, 75 Ohms, phase-locked to GPS | 8 | BNC |
| 1/5/10 MHz, 50 Ohms, phase-locked to GPS | 1 | BNC |
| 1 PPS, phase-locked to UTC** | 8 | BNC |
| TOD (Time-Of-Day) output compliant to NMEA0183 | 1 | DB9, RS-232C |

Part Numbers

| | |
|---|--|
| VCL-2145-LC-4EE-OCXO (AC or DC power 1+0 or 1+1) | VCL, 50 Channel GPS, L1 frequency, C/A Code Receiver and Primary Reference Clock. Provides 1PPS, NMEA, 1/5/10MHz, 2.048MHz, 2.048Mbits with SSM, 1.544Mbits Frequency Outputs with High Stability OCXO Holdover. |
| VCL-2145-LC-4EE-RbXO (AC or DC power 1+0 or 1+1) | VCL, 50 Channel GPS, L1 frequency, C/A Code Receiver and Primary Reference Clock. Provides 1PPS, NMEA, 1/5/10MHz, 2.048MHz, 2.048Mbits with SSM, 1.544Mbits Frequency Outputs with Rubidium (Atomic) Holdover. |

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Power Consumption:

Power Consumption with OCXO Oscillator:

- < 25W during startup,
- < 18W at steady state 23°C

Power Consumption with Rubidium Oscillator:

- < 40W during startup,
- < 32W at steady state 23°C

Clock performance - GPS

- ITU-T G.811

Frequency Accuracy:

- <1x10⁻¹¹ (24 hour average)
- G.811 quality when locked to GPS

Frequency Holdover

- Long-term stability: 1x10⁻¹⁰/day, 2x10⁻⁸/year
- Frequency stability: 6x10⁻¹⁰(-5°C to +55°C)

Environmental

Environmental characteristics (Equipment):

| | |
|-------------|--|
| Operational | -10°C to +60°C (Typical: +25°C) |
| Cold start | -0°C to +50°C |
| Storage | -20°C to +70°C |
| Humidity | 95% non-condensing |
| Cooling | Convention Cooled. No cooling fans are required. |

MTBF:

MTBF for VCL-2145-LC with RbXO Option:

- Per MIL-HDBK-217F: ≥ 17 years @ 40°C
- Per Telcordia SSR 332, Issue 1: ≥ 20 years @ 40°C

MTBF for VCL-2145-LC with OCXO Option:

- Per MIL-HDBK-217F: ≥ 21 years @ 40°C
- Per Telcordia SSR 332, Issue 1: ≥ 24 years @ 40°C

External Frequency Synchronization Inputs:

| Input Type | Number Of Inputs | Connector |
|--------------------|------------------|-----------|
| 2.048 MHz, 75 Ohms | 1 | BNC |
| 10 MHz, 50 Ohms | 1 | BNC |
| 2.048 Mbps | 1 | BNC |