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) Receiver also has an integrated, high bandwidth NTP Server engine that is capable of handling up to 6000 NTP requests per second. Multiple IRIG-B Outputs are also provided to synchronize local clock (time-of-day) display units as well as RTUs to a central timing source with nanosecond accuracy.

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 not only require highly precise G.811 frequency synchronization locked to a GPS Reference but who also need to distribute time-of-day in their networks.

The VCL-2145-LC / VCL-GPS-2145 is always locked to a GPS reference to provide multiple G.811 / Stratum 1 quality frequency and time-of-day (IRIG-B and NTP) outputs. The VCL-2145-LC is also equipped highly accurate, low-noise OCXO / Rubidium oscillator which provides a high stability holdover clock that is typical of a Network SSU in the event of the GPS signal or its 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, 2.048MBits, 1.544Mbits 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
- IRIG-B outputs
- Standard RJ45 and BNC connectors for all inputs and outputs
- ToD compliant to NMEA 0183 (DB9 Serial Port).

Standards & Compliance

- IEC, CE, FCC

Additional Features:

- High bandwidth NTP Server capable of supporting up to 6000 NTP requests per second
- IPv4 and IPv6 compatible NTP Server
- SSH, Telnet, Radius, SNMP V2 MIB, Password Protection
- Redundant AC and DC power supply options
- 4, 10/100/1000BaseT Network Interface Ethernet Ports
- 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:

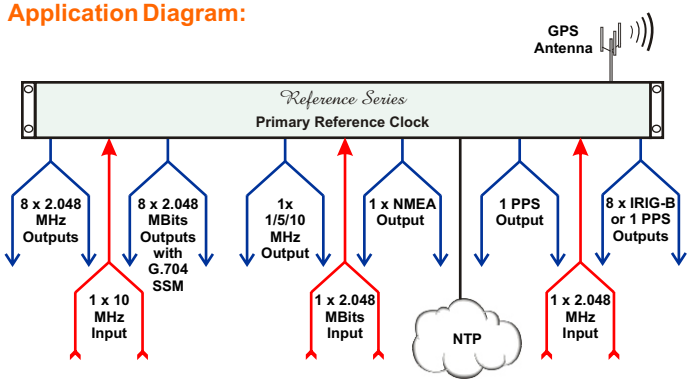
(i) VCL-2145-LC, GPS Primary Reference (PRC) G.811 Clock. Provides 1PPS, NMEA, 1/5/10MHz, 2.048MHz, 2.048Mbits with SSM, 1.544Mbits Frequency Outputs with High Stability OCXO and Rubidium (G.812) Holdover Clock options.

(ii) VCL-2145-LC, GPS Primary Reference (PRC) G.811 Clock with NTP Server. May be used in multi-service applications as a G.811, Primary Reference (PRC) Clock and NTP Server 1/5/10MHz, 2.048MHz, 2.048Mbits with SSM, 1.544Mbits GPS referenced outputs. OCXO and Rubidium (G.812) Holdover Clock options available.

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
- Distributing Time (ToD) and Frequency reference for power utilities across all nodes of the network
- Synchronization of Defense Networks
- Synchronizing airports and aviation communications
- Synchronizing railway signaling networks and railway communications
- Synchronizing traffic management
- 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. (90%)
  - Acquisition time - Warm Start: Less than 45 sec. (90%)
  - Acquisition time - Cold Start: Less than 140 sec. (90%)
- 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)

NTP Server:

- NTP Protocols: NTP v2 (RFC 1119), NTP v3 (RFC 1305), NTP v4
- IP Protocols: IPV4, IPV6
- Time Protocol: (RFC 868)
- Daytime Protocol: (RFC 867)
- Synchronization of IEC 61850 compliant devices using NTP/SNTP protocol
- Capable of processing up to 6000 requests per second.

Management and Monitoring Ports:

- RS-232C Connector
- USB Connector
- 10/100BaseT Ethernet
- 1 x External Alarm Relay Contact.

System Access, Control and Management Options:

- Telnet, SSH, RADIUS
- CLI Control Interface (HyperTerminal or Vt100)
- SNMP V2 Traps (MIB File provided)

Security and Protection:

- Password Protection
- Secured Access via SSH V2

Configuration and Monitoring Software:

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

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

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
IRIG-B, synchronized to GPS**	8	BNC
1 PPS, phase-locked to UTC**	8	BNC
TOD (Time-Of-Day) output compliant to NMEA0183	1	DB9, RS-232C
NTP Ports	2	RJ-45

***Note: User selectable between IRIG-B and 1PPS Outputs*

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 Clock.
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 Clock.

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U.K.

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