

## Product Overview

VCL-TP, C37.94 Optical Repeater is an extremely reliable and flexible C37.94 transmission product that re-generates and re-times the C37.94 optical signals and removes any residual jitter and wander, thereby making it suitable for extending C37.94 signals over long optical fiber links.

The VCL-TP, C37.94 is available with 1+1 Optical Link Redundancy (C37.94), 1+1 Redundant Power Supply options.



## Applications, Features and Benefits

- May be used as a C37.94 Signal Converter - to convert an optical signal from IEEE C37.94 compliant 850nm Multi-Mode C37.94 Distance Protection Relay and transmit it up to a distance of 180 KM on Single Mode optical fiber.
- Compatible with C37.94 Distance Protection Relays from all major manufacturers.
- May be used as a C37.94 Optical Repeater to extend the reach of the VCL-TP, Teleprotection Equipment beyond the distance of 180 KM. The combined reach of the VCL-TP, Teleprotection Equipment with one mid-span VCL-TP, C37.94 Optical Repeater may be up to 360 KM.
- Option of 1+1 Route / Path Protection for C37.94 Optical interface with less than 5ms link switching / link recovery time in the event of the working optical link failure.
- IRIG-B Synchronization for time-stamped alarms.
- Immunity to Voltage Dips, Short Power Supply Interruptions and Voltage Variations as per IEC 61000-4-11 specifications.

## Transmission Interface options include:

- IEEE C37.94 compliant 850nm (50 /125 um and 62.5/125um) Multi-Mode optical fiber interface for connecting to C37.94 Distance Protection Relays.
- IEEE C37.94 compliant 1310nm / 1550nm (9/125 um) Single-Mode optical fiber interface for transmission over long-reach, single-mode optical fiber links to extend Teleprotection Signals over long optical fiber links (  $\leq 40$  KM,  $\leq 80$  KM,  $\leq 120$  KM,  $\leq 150$  KM and  $\leq 180$  KM).
- Option of 1+1 redundant optical path protection / route protection.
- Laser: Class I (for Single-Mode Optical Interface) - Eye-safe as per EN 60825-1 specifications.

## Performance

- Less than signal 1ms transfer time over a 180 KM optical span.

## Error Detection and Coding

- Line Code Violation Detection
- LOS Detection
- Signal Re-timing, Re-generation and Block Command Encoding as per IEEE C37.94 for reliable transmission.

## Standards and Compliances

- Compliant with IEC 60834-1 and IEC 834-1 specifications and standards.

## Event and Alarm Logging

- Time-Stamped Alarm Logging
- Built-In (RTC) Real Time Clock
- IRIG-B Time Synchronization option to synchronize the RTC time-stamps with GPS.

## Management Interface

- RS232 serial, USB serial interfaces for local terminal access.
- 10/100BaseT Ethernet Interface for remote access over an IP network.

## Access and Monitoring

- Command Line Interface (English text commands).
- Telnet
- SSH
- SNMPv2 Traps.
- Encrypted Password Protection
- Maintains an access log of over 10,000 most recent entries for security audit.

## Power Consumption

- < 15 Watts.

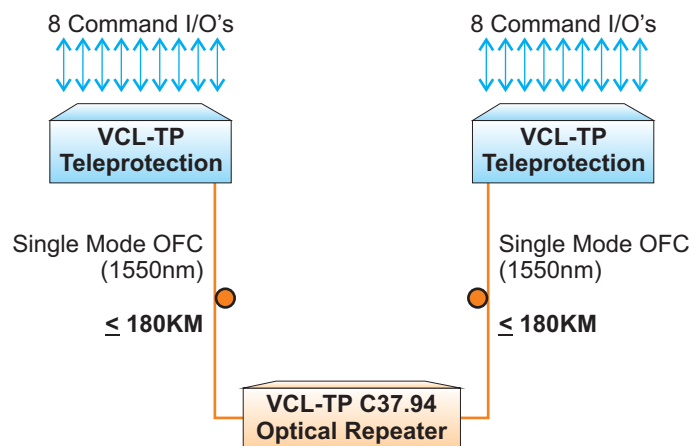
## EMI, EMC, Surge Withstand and other Compliances

EN 50081-2	EN 50082-2	IEC 60068-2-29
IEC 61000-4-6 (Conducted Immunity)	IEC 60068-2-6	IEC 60068-2-2
IEC 60068-2-78	IEC 60068-2-1	IEC 60068-2-14
CISPR 22 / EN55022 Class B (Conducted Emission and Radiated Emission)		
IS 9000 (Part II Sec. 1-4, Part III Sec. 1-5, Part IV, Part 14 Sec. 1-3)		
IEC 60870-2-1	IEC 61000-4-5	IEC 61000-4-12
IEC 61000-4-3 (Radiated Immunity)	IEC 61000-4-8	IEC 61000-4-16
IEC 61000-4-2	IEC 61000-4-10	Telcordia GR-1089 Surge and Power Contact
IEC 61000-4-4	IEC 61000-4-11	

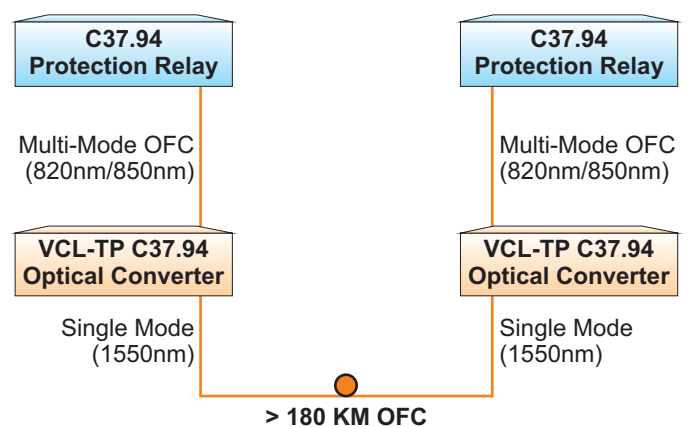
- ESD, Voltage and Surge Withstand: Meets and exceeds IEC 61000-4-2, IEC 61000-4-4, IEC 61000-4-5, Level 4 specifications.
- Immunity to Voltage Dips, Short Power Supply Interruptions and Voltage Variations meets and exceeds IEC 61000-4-11, Level 1 specifications.

## Application Diagrams

### VCL-TP, C37.94 Optical Repeater



### VCL-TP, C37.94 Optical Converter



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