



# VCL-2710 IEEE C37.94

Version 2.5

## MULTI-MODE TO SINGLE-MODE OPTICAL CONVERTER

### Introduction:

The VCL-2710, IEEE C37.94 Multi-Mode to Single-Mode Optical Converter is a ruggedized, sub-station-hardened converter that converts IEEE C37.94 Multi-Mode signal to Optical Single-Mode Optical signal. The equipment is designed to extend IEEE C37.94 multi-mode signals over extended single-mode optical fiber spans. The VCL-2710, IEEE C37.94 Multi-Mode to Single-Mode Optical Converter includes the clock synchronization and clock re-generation functions which allows it to transmit the IEEE C37.94 multi-mode signal over very long single-mode optical fiber links of up to 50dB optical link loss budget (i.e. typical reach of 167 Miles / 270 Kms).

VCL-2710 is designed for use in point-to-point applications. The VCL-2710 meets and complies with the IEC-61850-3, EMI, EMC, Surge and Temperature specifications making it suitable for sub-station installations to provide uninterrupted service even in the most demanding and harsh environments.

VCL-2710 is available in DIN Rail mount version and 1U high, standard 19-inch rack mount version.

### Features:

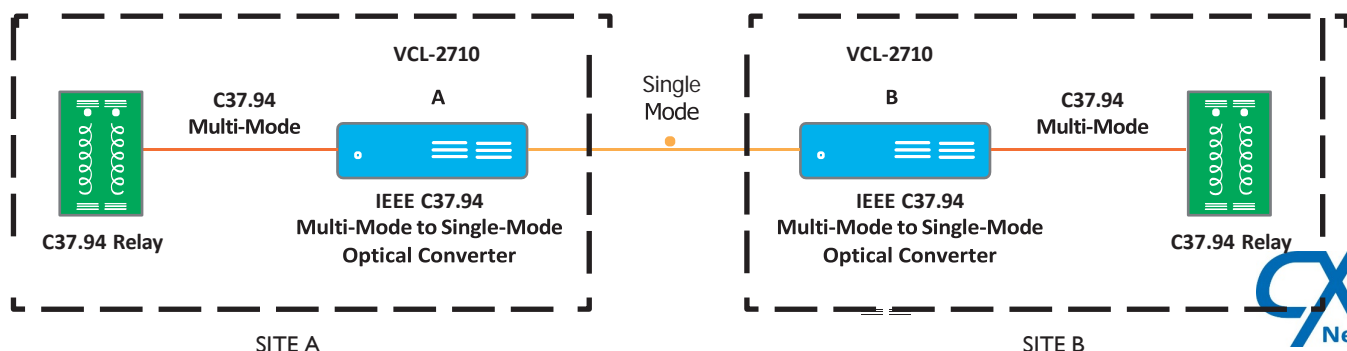
- Complies to IEEE C37.94 protocol
- Power Budget 13dB to 50dB in Single Mode
- Single and 1+1 redundant power supply option

The most common application of the VCL-2710 is to allow the user to transmit the existing IEEE C37.94 multi-mode interface over a single-mode optical fiber link without the need to install any additional multiplexers or transmission equipment, which would otherwise be required to inter-connect the IEEE C37.94 Relays between near-end and the far-end substations.

### C37.94 Interface Specifications

|                               |                          |
|-------------------------------|--------------------------|
| Number of interfaces per card | 1 Tx, 1 Rx               |
| Standards                     | IEEE C37.94              |
| Optical                       | 820nm / 850nm Multi-Mode |
| Optical Connector             | ST                       |
| Optical Transmitter           | LED                      |

### Application Diagram



DIN Rail Mount Version



1U high, standard 19-inch Rack Mount Version

### Technical Specifications:

#### Connector

|                       |  |
|-----------------------|--|
| Power                 | Terminal Block, 2-PIN Supply Connector |
| IEEE C37.94 Interface | ST Connector                           |
| Optical Interface     | SFP Module                             |
| External Alarm        | Terminal Block, 3-PIN Connector        |

#### Chassis

- DIN Rail Mounting.
- 1U high, 19-inch Rack Mounting

#### Power Supply

- 48V DC (18V to 60V DC)
- 110V DC, 220V DC, 100~240V AC
- Redundant 1+1 power supply option available in 19-inch Rack Mount Version

#### Optical Interface Specifications

|                     |  |
|---------------------|--|
| Optical Module Type | SFP  |
| Connector           | LC   |
| Fiber               | Single-mode 1310 nm, 1550 nm   |
| Distance            | ≤ 15 KM, ≤40 KM, ≤80 KM,<br>≤160 KM, ≤180 KM, ≤200 KM,<br>≤260 KM, ≤270 KM (typical reach) |
| Type                | Laser  |

**Environmental**

|                            |                                     |
|----------------------------|-------------------------------------|
| Operating Temperature      | -20°C to +60°C                      |
| Maximum Operating Humidity | 95% R.H., Non-Condensing            |
| Maximum Operating Altitude | Up to 3,000 meters above sea Level  |
| Operation                  | Complies with ETS 300 019 Class 3.2 |
| Storage Temperature        | -40C to +70C                        |
| Storage                    | Complies with ETS 300 019 Class 1.2 |
| Maximum Storage Humidity   | 98% R.H., Non-Condensing            |
| Maximum Storage Altitude   | Up to 3,000 meters above sea level  |
| Transportation             | Complies with ETS 300 019 Class 2.3 |

**EMI, EMC, Surge Withstand and other Compliances:**

|  |               |                |
|--|---------------|----------------|
| EN 50081-2   | EN 50082-2    | IEC 60068-2-29 |
| IEC 61000-4-6 (Conducted Immunity)                                       | IEC 60068-2-2 |                |
| IEC 60068-2-78   | IEC 60068-2-1 | IEC 60068-2-14 |
| CISPR 32 / EN55032 Class A (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 61000-4-2  |
| IEC 61000-4-3 (Radiated Immunity)  | IEC 61000-4-8 | IEC 61000-4-4  |
| Telcordia GR-1089 Surge and Power Contact                                |               |                |

**Electromagnetic Standards Compliance:**

- EN 50081-2, EN 50082-2
- IEC 61000-6-2 (Immunity)
- IEC 61000-6-4 (Emission)
- Complies to IEEE and IEC standards

**CE Compliance:**

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility 2014/30/EU

**Other Regulatory Compliances:**

- RoHS, CE Marking
- Complies with FCC Part 68 and EMC FCC Part 15
- Telcordia GR-1089 Surge and Power Contact

**MTBF:**

- Per MIL-HDBK-217F: ≥ 37 years @ 24C
- Per Telcordia SSR 332, Issue 1: ≥ 42 years @ 24C

**Mechanical Specifications:**

**DIN Rail Mount Version**

- H x W x D: 72.0mm x 190.0mm x 176.5mm
- Weight: 1.5 KG

**1U, 19-inch Rack Mount Version**

- H x W x D: 44.0mm x 484.0mm x 177.0mm
- Weight: 2.9 KG

**Ordering Information:**

| Part No.              | Description:   |
|-----------------------|--|
| VCL-2710-DIN-DC018060 | VCL-2710, IEEE C37.94 Multi-Mode to Optical Converter DIN Rail Mount Version<br>1 x 18~60V DC (48V DC nominal) Power Supply Input  |
| VCL-2710-RAC          | VCL-2710, IEEE C37.94 Multi-Mode to Optical Converter 19-Inch, Rack Mount Version  |
| Supports:             | - 1 x C37.94 Optical INPUT Interface [850nm, MM, 2 x ST (Tx/Rx) connector]<br>- 1 x 1310nm/1550nm (SM) Optical OUTPUT Interface (Without SFP)<br>- Management: Serial Interface (USB)<br>- Installation Kit: System Core Cables, Mounting Hardware, Documentation, User Manual<br>[# Add Power Supply] |

**# Add Power Supply Option - DIN Rail (Optional):**

|                     |  |
|---------------------|--|
| VCL-EMOD 0444-AC220 | External Power Supply - DIN Rail Mount Power Supply (External) AC to DC Converter, DRL30-24-1, DIN Rail Mount :<br>- Input : 1 x AC Input [90~240V AC, 50-60Hz]<br>- Output 1 x DC Output [24VDC~1.25A, 30W] |
| VCL-EMOD 0444-DC220 | External Power Supply - DIN Rail Mount Power Supply (External) DC to DC Converter, DRL30-24-1, DIN Rail Mount :<br>- Input 1 x DC Input [110~250V DC]<br>- Output 1 x DC Output [24VDC~1.25A, 30W]           |

**# Add Power Supply Option 19-inch Rack Mount (any one option):**

|        |  |
|--------|--|
| AC220  | 1 x 110~240V AC Power Supply Input             |
| AC220R | 2 x 110~240V AC Power Supply Input [Redundant] |
| DC048  | 1 x 48V DC Power Supply Input                  |
| DC220  | 1 x 110~250V DC Power Supply Input             |
| DC048R | 2 x 48V DC Power Supply Input [Redundant]      |
| DC220R | 2 x 110~250V DC Power Supply Input [Redundant] |

**# Select SFP option from below:**

|                   |   |
|-------------------|---|
| VCL-EMOD 0193-C37 | SFP Transceiver, Duplex LC, 13dB, 1310nm, 9 Miles / 15Km, SM (Single-Mode)          |
| VCL-EMOD 0194-C37 | SFP Transceiver, Duplex LC, 29dB, 1310nm, 25 Miles / 40Km, SM (Single-Mode)         |
| VCL-EMOD 0217-C37 | SFP Transceiver, Duplex LC, 34dB, 1550nm, 49 Miles / 80Km, SM (Single-Mode)         |
| VCL-EMOD 0402-C37 | SFP Transceiver, Duplex LC, 36dB, 1550nm, 99 Miles / 160Km, SM (Single-Mode)        |
| VCL-EMOD 0171-C37 | SFP Transceiver, Duplex LC, 46dB, 1550nm, 111 Miles / 180Km, SM (Single-Mode)       |
| VCL-EMOD 0244-C37 | SFP Transceiver, Duplex LC, 47dB, 1550nm, 124 Miles / 200Km, SM (Single-Mode)       |
| VCL-EMOD 0364-C37 | SFP Transceiver, Duplex LC, CWDM, 46dB, 1550nm, 161 Miles / 260Km, SM (Single-Mode) |
| VCL-EMOD 0490-C37 | SFP Transceiver, Duplex LC, CWDM, 50dB, 1550nm, 167 Miles / 270Km, SM (Single-Mode) |



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