Introduction:

The VCL-2709, IEEE C37.94 to E1 Converter is a ruggedized and robust, sub-station-hardened protocol converter that converts IEEE C37.94 data to E1 data. VCL-2709 supports point-to-point applications.

VCL-2709, IEEE C37.94 to E1 equipment includes precise clock recovery and clock re-generation functions which allows the transmission of IEEE C37.94 channels over an E1/SDH network for error free transmission.

The most common application for the VCL-2709 converter is for augmenting legacy IEEE C37.94 data transmission over an E1 network between two sub-stations. By installing a VCL-2709 converter, the existing IEEE C37.94 interfaces from protection relays can be transmitted over the E1 network without incurring large capex, or without the tiresome task of having to replace or rewire the IEEE C37.94 Relays which need to be interconnected to the far end substations over E1 (SDH) transmission links.

- Number of C37.94 interfaces per card: 1
- Number of interfaces: 1 E1 (2.048 Mbit/s) Interface (Electrical G.703)

VCL-2709 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.

Application Diagram:

Technical Features:

Connectors:
- Power: Terminal Block, 2-Pin Supply Connector
- IEEE C37.94 Interface: ST / LC Connector (SFP)
- E1 Interface: RJ45 (F) / BNC (F) Connector

Chassis:
- DIN Rail Mounting.

Power Supply:
- Internal: 48V DC (18V to 60V DC)
- External Adapters: 110V DC, 220V DC, 100~240V AC

C37.94 Interface Specifications:

<table>
<thead>
<tr>
<th>Interfaces per card</th>
<th>1 Tx, 1 Rx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards</td>
<td>IEEE C37.94</td>
</tr>
<tr>
<td>Optical connector</td>
<td>ST or LC (SFP)</td>
</tr>
<tr>
<td>Optical Transmitter</td>
<td>LED or Laser</td>
</tr>
<tr>
<td>Optical</td>
<td>820nm/850nm Multi-Mode 1310nm/1550nm Single Mode (Modulation as per IEEE C37.94)</td>
</tr>
</tbody>
</table>

E1 Interface Specifications:

<table>
<thead>
<tr>
<th>Number of interfaces</th>
<th>1 E1 Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conformity (electrical)</td>
<td>G.703</td>
</tr>
<tr>
<td>Frame structure</td>
<td>As per ITU (CCITT) G.704</td>
</tr>
<tr>
<td>Code</td>
<td>HDB3, 50 % Duty Cycle</td>
</tr>
<tr>
<td>Nominal Impedance</td>
<td>120 Ohms balanced / 75 Ohms Unbalanced</td>
</tr>
<tr>
<td>Nominal pulse width</td>
<td>244 ns</td>
</tr>
<tr>
<td>Pulse mask</td>
<td>As per ITU (CCITT) Rec. G.703</td>
</tr>
<tr>
<td>Jitter tolerance</td>
<td>As per ITU (CCITT) G.823</td>
</tr>
<tr>
<td>Frame alignment</td>
<td>As per ITU (CCITT) G.732</td>
</tr>
</tbody>
</table>
Technical Specification

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 2.3
Storage Temperature: -40°C to +70°C
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 IEC 60068-2-6 IEC 60068-2-2
IEC 60068-2-78 IEC 60068-2-1 IEC 60068-2-14
CISPR 32 / EN55032 Class A
(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 61000-4-3 IEC 61000-4-8
(Radiated Immunity)
IEC 61000-4-2 IEC 61000-4-11 Telcordia
IEC 61000-4-4 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

Ordering Information (Base Unit):

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
</table>
| VCL-2709-ST | IEEE C37.94 to E1 Converter DIN Rail Mount Version Supports:
- 1 x C37.94, Tx, 820nm, MM, ST
- 1 x C37.94, Rx, 820nm, MM, ST
[Add E1 and Power Supply] |
| VCL-2709-LC | IEEE C37.94 to E1 Converter DIN Rail Mount Version Supports:
- 1 x C37.94 protocol Optical Interface [without SFP]
[1 x SFP to be ordered separately]
[Add E1 and Power Supply] |

Select SFP option from below:

<table>
<thead>
<tr>
<th>SFP Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCL-EMOD 0262-TP</td>
<td>SFP Transceiver Duplex LC, 850nm, 2Km, MM (Multi-Mode)</td>
</tr>
<tr>
<td>VCL-EMOD 0294-TP</td>
<td>SFP Transceiver Duplex LC, 1310nm, 2Km, MM (Multi-Mode)</td>
</tr>
</tbody>
</table>

Add E1 Option:

- 120 1 x 120 Ohms E1 (RJ45 Female)
- 075 1 x 75 Ohms E1 (BNC Female)

Add Power Supply Option:

- DC018060 1 x 18~60V DC (48V DC nominal) Power Supply Input
- DC110 1 x 110V DC (90V~250V) Power Supply Input (External Adaptor)
- DC220 1 x 220V (90V~250V) DC Power Supply Input (External Adaptor)
- AC220 1 x 100~240V, 50/60Hz AC Power Supply Input (External Adaptor)

Add Accessories:

| VCL-HRNS 1292 | Optical Patch Cord Connectorized Cable [ST-FC, 3m, Multi Mode] |
| VCL-HRNS 1301 | Optical Patch Cord Connectorized Cable [ST-LC, 3m, Multi Mode] |

Technical specifications are subject to changes without notice.
All brand name and trademarks are the property of their respective owners.
© Copyright: Valiant Communications

Revision – 2.1, July 02, 2020