

Introduction:

The VCL-MX-1554-RAC, Quad (x4) IEEE C37.94 to E1 Converter is a ruggedized and robust, sub-station-hardened protocol converter that converts up to 4 x IEEE C37.94 interfaces to 4 x E1 interfaces. VCL-MX-1554-RAC supports point-to-point and point-to-multipoint applications for Differential and Distance Teleprotection.

The most common application for the VCL-MX-1554-RAC converter is for transmitting IEEE C37.94 data over an E1 network between sub-stations. By installing a VCL-MX-1554-RAC converter, the existing IEEE C37.94 interfaces from differential 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.

VCL-MX-1554-RAC 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.

Latency:

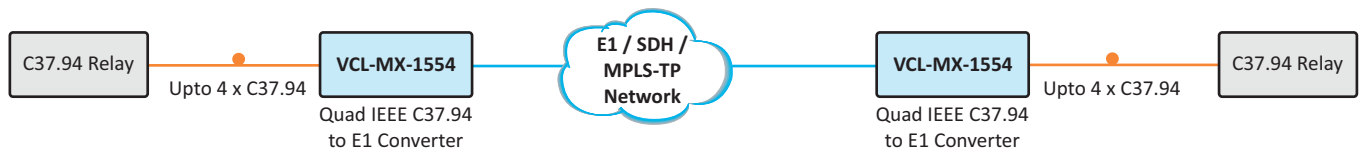
- 250us (i.e. 0.25ms) total, in an end-to-end (in a back-to-back) deployment.

E1 Interface Specifications:

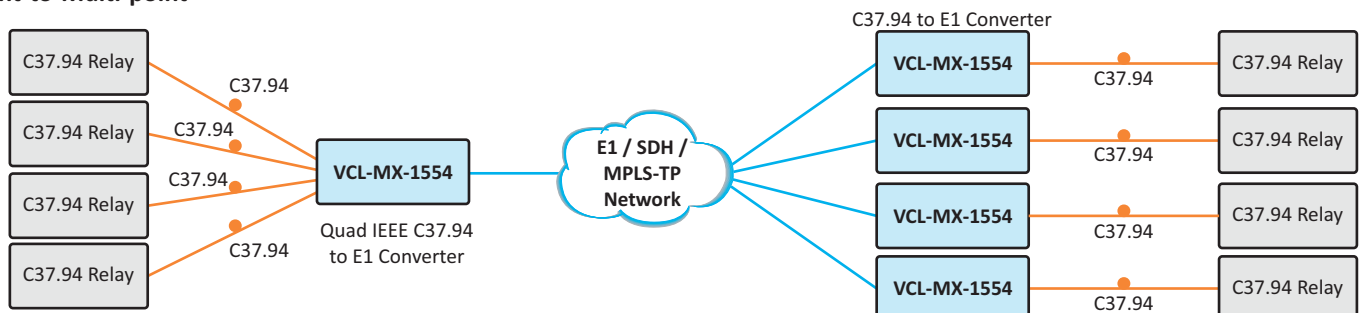
Interfaces per unit	4
Conformity (electrical)	ITU-T G.703
Frame structure	As per ITU G.704
Code	HDB3, 50 % Duty Cycle
Nominal Impedance	120 Ohms Balanced 75 Ohms Unbalanced (Option)
Nominal pulse width	244 ns
Pulse mask	As per ITU Rec. G.703
Jitter tolerance	As per ITU G.823
Frame alignment	As per ITU G.732

Application Diagrams:

Point-to-Point



Point-to-Multi-point



IEEE C37.94 Interface Specifications Option #1:

Interfaces per unit	4 (4 Tx, 4 Rx)
Standards	IEEE C37.94
Optical connector	ST
Optical Transmitter	LED
Optical	820nm/850nm Multi-Mode

IEEE C37.94 Interface Specifications Option #2:

Interfaces per unit	4 (4 Tx, 4 Rx)
Standards	Modulation as per IEEE C37.94
Optical connector	LC (SFP)
Optical Transmitter	Laser
Optical	820nm/850nm Multi-Mode 1310nm/ 1550nm Single Mode

Management and Monitoring:

- Serial RS232 and USB interfaces for local terminal access
- 10/100BaseT Ethernet Interface for remote access over an IP network
- Encrypted Password Protection
- Telnet (with clear text disable option)
- SSH - Secured remote access using Secure Shell Protocol over IP links
- SNMPv2 / SNMPv3 Traps and NMS for secure, real time remote monitoring
- Centralised NMS option for remote monitoring and management of up to 2,000 units from central site over an IP network
- LED Alarm Indicators
- Dry contact external alarm relay to connect an external alarm on an annunciator panel, which can be wired up for either NO or NC condition.

Technical Specifications

Management:

- 1 x RJ45 Interface (10/100BaseT)
- Telnet (with clear text disable option)
- SSH, SNMPv2, SNMPv3
- 1 x Serial USB.

Connectors

Power	Terminal Block, 2-PIN Supply Connector for DC C14 Connector for AC
IEEE C37.94 Interface	ST / LC
E1 Interface	RJ45 (F) / BNC (F) Connector

Power Supply 1+1 redundant options:

- 48V DC; 110V DC; 220V DC;
- 90~240V AC, 50/60Hz.

Environmental:

Operating Temperature	-20°C to +60°C
Max. Operating Humidity	95% R.H., Non-Condensing
Max. Operating Altitude	Up to 3,000 meters above sea level
Operation	ETS 300 019 Class 3.2
Storage Temperature	-40°C to +70°C
Storage	ETS 300 019 Class 1.2
Max. Storage Humidity	98% R.H., Non-Condensing
Max. Storage Altitude	Up to 3,000 meters above sea level
Transportation	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 60068-2-2	IEC 60068-2-78
(Conducted Immunity)	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 61000-4-8
IEC 61000-4-3	IEC 61000-4-2	IEC 61000-4-4
(Radiated Immunity)		

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, Meets CE requirements
- Complies with FCC Part 68 and EMC FCC Part 15

Mechanical Specifications:

- H x W x D : 44 x 484 x 390mm
- Weight: 2.3 Kgs.
- 1U, 19-Inch Rack Mountable.

Ordering Information (Base Unit):

Part No.	Description
VCL-MX-1554 -RAC-ST	QUAD IEEE C37.94 to E1 Converter for Differential and Distance Teleprotection 19-Inch Rack Mountable Supports: - 4 x C37.94, Tx, 820nm/850nm, MM, ST - 4 x C37.94, Rx, 820nm/850nm, MM, ST - [# Add E1 Option] - [# Add Power Supply Option] Management: 1 x RJ45 Interface (10/100BaseT) Telnet (with clear text disable option), SSH, SNMP and 1 x Serial USB. Installation Kit: System Core Cables, Mounting Hardware, Documentation.
VCL-MX-1554 -RAC-LC	QUAD IEEE C37.94 to E1 Converter for Differential and Distance Teleprotection 19-Inch Rack Mountable Supports: - 4 x C37.94 protocol Optical Interface [without SFP] (^SFPs to be ordered separately) - [# Add E1 Option] - [# Add Power Supply Option] Management: 1 x RJ45 Interface (10/100BaseT) Telnet (with clear text disable option), SSH, SNMP and 1 x Serial USB. Installation Kit: System Core Cables, Mounting Hardware, Documentation.

Add E1 Option:

120	4 x 120 Ohms 2.048Mbps E1 (RJ45 Female)
075	4 x 75 Ohms 2.048Mbps E1 (BNC Female)

Add Redundant (1+1) Power Supply Option:

AC220	100~240V AC, 50/60Hz, Power Supply Input
DC048	48V DC (18V~60V), Power Supply Input
DC220	220V DC (90V~250V), Power Supply Input

Add SFP Option:

VCL-EMOD 0469-C37	SFP Transceiver, Duplex LC, 14dB, 850nm, 1.24 Miles / 2Km, MM (Multi-Mode)
VCL-EMOD 0294-C37	SFP Transceiver, Duplex LC, 12dB, 1310nm, 1.24 Miles / 2Km, MM (Multi-Mode)
VCL-EMOD 0193-C37	SFP Transceiver, Duplex LC, 13dB, 1310nm, 9.32 Miles / 15Km, SM (Single-Mode)

*Add Accessories:

VCL-HRNS 1273	Optical Patch Cord Connectorized Cable [2LC-2LC, 3m, MM]
VCL-HRNS 1301	Optical Patch Cord Connectorized Cable [2ST-2LC, 3m, MM]
VCL-HRNS 1229	Optical Patch Cord Connectorized Cable [2LC-2LC, 3m, SM]
VCL-HRNS 1247	75 Ohm Connectorized Cable [BNCM-BNCM, 3 meter]

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