



VictoriaCombo 10G Module

Tailored Test Solution for Legacy SDH/SONET and Next Generation Services

Optical Interfaces

- Bit rate: 9953280 kbit/s
- Interfaces according to ITU-T G.691 S.64.1 (1310 nm) or S64.2b (1550 nm)
- Field-removable FC (default), SC or ST connectors
- Automatic disconnection of the receiver for overload protection
- Unpluggable transmitter and receiver modules

Modes

- Standard (SDH/SONET termination)
- Through mode for all interfaces

SDH

General

- According to ITU-T G.707 and O.181
- Programmable content of tributaries not being tested

Mappings

- C-4-64c in STM-64
- C-4-16c in STM-64
- C-4-4c in STM-64
- C-4 in STM-64

Programmable Bytes

Editing and display in hexadecimal or by descriptor

- RSOH: all RSOH bytes
- MSOH: columns in positions 1, 4 and 7 for each STM-1 tributary, rows 5 to 9, except B1, B2 and M0-M1 and K2 bits from 6 to 8; in first STM-1 tributary page: D4-D12, S1, Z1, Z2, E2
- HO-POH (VC-4, VC-3): J1, C2, G1, H4, K3, N1

Path Trace

- Generation, analysis and expected 16- and 64-byte messages in J0 and J1

Errors

- Insertion and detection of FAS, OOF, B1, B2, MS-REI, HP-B3, HP-REI, slips (detection) and TSE
- Insertion mode: single, burst, repetitive burst and rate ($m \times 10^{-n}$) with programmable m and n . $m = 0.9, 1, 1.1$; $n = 3, 4, 5, 6, 7, 8, 9$

Alarms

- Insertion and detection of LOS, LOF, RS-TIM, MS-AIS, MSF-AIS, MS-RDI, AU-AIS, AU-LOP, HP-UNEQ, HP-RDI, HP-TIM, HP-PLM, RFI, LSS, AIS pattern
- Insertion mode: continuous, burst of m frames with alarm, repetitive m/n burst
- Repetitive m/n burst applies to: OOF, LOF, MS-AIS, AU-AIS, AU-LOP, HP-RDI

Pointer Events

- Increment, decrement, manual value with/without NDF, invalid pointer in AU-4, AU-4-4c, AU-4-16c and AU-4-64c
- G.783/O.172 pointer sequences
- Programming of SS bits

Frame OH Capture

- Capture of OH bytes on several consecutive frames
- Resolution: 1 frame
- Types of capture (selectable): continuous (display of OH bytes), manual, triggered by event (MS-AIS, AU-AIS, MS-RDI), triggered by byte value detection (equal, different or byte mask)
- Type of capture mode by trigger, starting from trigger detection: pre-trigger (previous n frames), post-trigger (next n frames), centred (previous $n/2$ and next $(n-1)/2$ frames)

FEC

- According to ITU-T G.707 (In-band FEC)
- Generation: correct FEC blocks, correctable FEC blocks
- Analysis: correct FEC blocks, errored correctable FEC blocks, errored uncorrectable FEC blocks, total errored FEC blocks

TCM

- Generation and analysis of N1
- Generated events: TC-IEC, TC-OEI, TC-REI, TC-AIS, TC-LTC, TC-UNEQ, TC-ODI, TC-RDI, TC-TIM
- Event detection, display, performance calculation and storage: TC-IEC, TC-OEI, TC-REI, TC-AIS, TC-LTC, TC-UNEQ, TC-ODI, TC-RDI, TC-TIM
- B3 compensation
- Analysis and generation of APId (Access Point Identifier)

SONET

General

- According to ANSI.105-1995 and Telcordia GR-253
- Programmable content of tributaries not being tested

Mappings

- STS-192c SPE in OC-192
- STS-48c SPE in OC-192
- STS-12c SPE in OC-192
- STS-3c SPE in OC-192

Programmable Bytes

Editing and display of all bytes in hexadecimal or by descriptor:

- SOH: A1, A2, J0, C1
- LOH: columns in positions 1, 4 and 7 for each OC-3 tributary, rows 5 to 9, except B1, B2 and M0-M1 and K2 bits from 6 to 8; in first OC-3 tributary page: D4-D12, S1, Z1, Z2, E2
- STS-POH: J1, C2, G1, H4, K3, Z5

J0, J1 trail trace

- Generation, analysis and expected 16- and 64-byte messages in J0 and J1

Errors

- Insertion and detection of FAS, SEF, B1, B2, REI-L, STS-B3, REI-P, slips (detection) and TSE errors
- Insertion mode: single, burst, repetitive burst and rate ($m \times 10^{-n}$ with programmable m and n . $m = 0.9, 1, 1.1$; $n = 3, 4, 5, 6, 7, 8, 9$)

Alarms

- Insertion and detection of LOS, LOF, TIM-S, AIS-L, RDI-L, AIS-P, LOP-P, UNEQ-P, RDI-P, TIM-P, PLM-P, LSS, pattern AIS
- Insertion mode: continuous, burst of m frames with alarm, repetitive m/n burst
- Repetitive m/n burst applies to: SEF, LOF, AIS-L, AIS-P, LOP-P, RDI-P

Pointer Events

- Increment, decrement, manual value with/without NDF, invalid pointer in STS-192c SPE, STS-48c SPE, STS-12c SPE and STS-3c SPE
- G.783/O.172 pointer sequences
- Programming of SS bits

Frame OH Capture

- Capture of OH bytes on several consecutive frames
- Resolution: 1 frame
- Types of capture (selectable): continuous (display of OH bytes), manual, triggered by event (AIS-L, AIS-P, RDI-L), triggered by byte value detection (equal, different or byte mask)
- Type of capture mode by trigger, starting from trigger detection: pre-trigger (previous n frames), post-trigger (next n frames), centred (previous $n/2$ and next $(n-1)/2$ frames)

FEC

- According to ITU-T G.707 (In-band FEC)
- Generation: correct FEC blocks, correctable FEC blocks
- Analysis: correct FEC blocks, errored correctable FEC blocks, errored uncorrectable FEC blocks, total errored FEC blocks

Test Patterns

The following test patterns can be generated and analysed:

- PRBS23, PRBS31: normal or inverted
- PRBS11, PRBS15 for BERT in OH bytes: normal or inverted
- Word: user-defined, all zeros, all ones

Functions

Results

- Counters, errored seconds and rate for all events: errors, alarms and pointer events

Trace

- Events are shown graphically in time plots and histograms that have advanced filtering, identification and quantization functions, and a zoom from 1 s to 1 h

Performance

- Performance measurements in line with ITU-T M.2101, G.826, G.828 and G.829; Counter, rate, unavailability and Pass/Fail indication for compliance with programmed objectives
- User-programmable statistics periods: the measurement can be divided into user-defined periods.
 - Error performance parameters will be registered and stored at the end of each period
 - A report containing information on all user-defined periods is created at the end of the measurement
 - If a serial printer is connected to the unit, a dump is made at the end of each statistical period during the measurement

Round Trip Delay

- In all interfaces; range from 1 ms to 10 s

Autoconfiguration

- Incoming signal mapping
- PRBS

FastScan

- Search the incoming signal for all types of errors, alarms and events

Transparency Test

- Generation and analysis of PRBS patterns in DCC channels or E1, E2, F1, N1 and N2 bytes
- Bit error counter, rate and errored seconds
- Seconds with alarm counter for LSS

APS

- Disruption time measurement for any STM-N/OC-N
- Tributaries: SDH, SONET
- Triggers: MS-AIS/AIS-L, AU-AIS/AIS-P and AIS pattern
- Range: 1 ms to 10 s
- Resolution: 1 ms

Optical Power Measurement

- Range: +2 to -40 dBm

- Resolution: $\pm 0,1$ dB

Frequency Measurement

- In bits/s with deviation in ppm
- ITU-T/ANSI in-range and out-of-range indication

Transmission Clock Frequency Offset

- Up to ± 50 ppm in steps of 0.01 ppm

General

- Dimensions (w x h x d): 270 x 220 x 50.8 mm
- Weight: 1,3 kg

RF/EMI, ESD and Electrical Safety

- Radiated EMI: EN55022
- Immunity to EMI: EN61000-4-3
- ESD: EN61000-4-2
- Electrical safety: EN60950

Environmental Conditions

- Operation: 0 to 45 °C
- Storage: -25 to +70 °C
- Humidity: 5 to 90% (without condensation)

Ordering Information

10G Module Base Unit

| Part Number | Description |
|-------------|---|
| CX00000 | 10 Gbit/s Combo Module |
| CX000001 | Optical transmitter 1310 nm sub-module |
| CX000002 | Optical transmitter 1550 nm sub-module |
| CX000003 | Optical receiver sub-module |
| CX000004 | Optical transmitter 1310 nm & 1550 nm sub-modules |

10G Module Options

| Part Number | Description |
|-------------|--|
| CX000005 | Optical receiver sub-module for 10 Gbit/s applications with optical sensitivity of -20 dBm |
| CX0H01 | SC connectors replacing the standard FC-PC connectors |
| CX0H02 | SC connectors replacing the standard FC-PC connectors |
| CX0S01 | Forward Error Correction (FEC) option according to ITU-T G.707 |

Trend Communications Ltd.
Whitebrook Park
Lower Cookham Road
Maidenhead, Berkshire SL6 8XY
United Kingdom

Trend Communications S.L.
Pujades, 60
08005 Barcelona
España

infoline@trendcomms.com
www.trendcomms.com

International.....+44 (0) 1628 503500
UK..... 01628 503529
España..... 93 300 3313
Deutschland..... 089 32 30 09 30
France.....01 69 35 54 70
China.....010 8518 3141
India.....11 25554161

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