

# Technical Data

# Victoria Combo 10G Module

Tailored Test Solution for the Next Generation Networks

## Optical Interface

- Bit rate: 9953280 kbit/s
- Interfaces according to ITU-T G.691 S.64.1 (1310nm) or S64.2b (1550nm)
- Field-removable FC (default), SC (option C10SC) or ST (option C10ST) connectors
- Automatic disconnection of the receiver for overload protection
- Unpluggable transmitter and receiver modules

## Modes

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

## SDH

### General

- According to 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

Edition and display in hexadecimal or by descriptor

- RSOH: All the RSOH bytes
- MSOH: Columns in positions 1, 4 and 7 of every STM-1 tributary, rows 5 to 9 excepting B1, B2 and M0-M1 and bits 6 to 8 of K2. 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, J1

### Errors

- Insertion and detection of FAS error, 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 M, N programmable. 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 or 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
- Capture 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 (N previous frames), post-trigger (Next N frames), centered ( $(N/2)$  previous and  $(N-1)/2$  next frames)

### FEC (option C10FEC)

- According to G.707 (In-Band FEC)
- Generation: correct FEC blocs, correctable FEC blocs
- Analysis: correct FEC blocs, errored correctable FEC blocs, errored uncorrectable FEC blocs, total errored FEC blocs



## TCM

- Generation and analysis of N1
- Events generated: TC-IEC, TC-OEI, TC-REI, TC-AIS, TC-LTC, TC-UNEQ, TC-ODI, TC-RDI, TC-TIM
- Detection, display, performance calculation and storage of events: 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

Display of all bytes and edition in hexadecimal or by descriptor of:

- SOH: A1, A2, J0, C1
- LOH: Columns in positions 1, 4 and 7 of every OC-3 tributary, rows 5 to 9 excepting B1, B2 and M0-M1 and bits 6 to 8 of K2. 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, J1

### Errors

- Insertion and detection of FAS error, 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 M, N programmable. 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 or 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
- Capture 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 (N previous frames), post-trigger (Next N frames), centered ( $(N/2)$  previous and  $(N-1)/2$  next frames)

### FEC (option C10FEC)

- According to G.707 (In-Band FEC)
- Generation: correct FEC blocs, correctable FEC blocs
- Analysis: correct FEC blocs, errored correctable FEC blocs, errored uncorrectable FEC blocs, total errored FEC blocs

### Test Patterns

The following test patterns can be generated/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 filter, 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 of compliance with programmed objectives

#### Round Trip Delay

- In all interfaces; range from 1  $\mu$ s to 10 s

#### AutoConfiguration

- Mapping of the incoming signal
- PRBS

#### FastScan

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

#### Transparency Test

- Generation and analysis of PRBS pattern 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

- Measurement of disruption time for any STM-N/OC-N
- Tributaries: SDH, SONET
- Triggers: MS-AIS/AIS-L, AU-AIS/AIS-P and Pattern AIS
- Range: 1 ms to 10 s
- Resolution: 1 ms

## Optical Power Measurement

- Range: +2 to -40 dBm
- Resolution: ±0,1 dB

## Frequency Measurement

- In bit/s with deviation in ppm
- ITU-T/ANSI in-range or out-of-range indication

## Frequency Offset of the Transmission Clock

- Up to ±50 ppm in steps of 0.01 ppm

## General

- Dimensions(w x h x d): 270 x 220 x 50.8 mm
- Weigh: 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

- Operates from 0 to 45 °C
- Storage: -25 to +70 °C
- Humidity: 5 to 90%, without condensation

## Ordering Information

### 10Gbit/s Configurations

Part Number	Description
COMBO10C1	Victoria Combo for SDH/SONET 10Gbit/s applications. 1310nm transmitter
COMBO10C2	Victoria Combo for SDH/SONET 10Gbit/s applications. 1550nm transmitter
COMBO10C4	Victoria Combo for SDH/SONET 10Gbit/s applications. 1310 and 1550nm transmitters

### Components of COMBO10C1

Part Number	Description
COMBOPT	Victoria Combo platform without application modules
C10	10 Gbit/s module (without Tx and Rx sub-modules)
C10TC1	10 Gbit/s 1310nm Tx sub-module
C10R	10 Gbit/s Rx sub-module
AD10FC	FC-FC 10dB Optical Attenuator

### Components of COMBO10C2

Part Number	Description
COMBOPT	Victoria Combo platform without application modules
C10	10 Gbit/s module (without Tx and Rx sub-modules)
C10TC2	10 Gbit/s 1550nm Tx sub-module
C10R	10 Gbit/s Rx sub-module
AD10FC	FC-FC 10dB Optical Attenuator

### Components of COMBO10C4

Part Number	Description
COMBOPT	Victoria Combo platform without application modules
C10	10 Gbit/s module (without Tx and Rx sub-modules)
C10TC1	10 Gbit/s 1310nm Tx sub-module
C10TC2	10 Gbit/s 1550nm Tx sub-module
C10R	10 Gbit/s Rx sub-module
AD10FC	FC-FC 10dB Optical Attenuator

### Components of COMBOPT

Part Number	Description
CDISP	Victoria Combo Front Module with display
CREAR	Victoria Combo Rear Module
ML360	Victoria Combo soft carrying bag
CSTRAP	Multi-Use strap
CCDROM	CD-ROM
MOCOMBO	English Quick Reference Guide (50 pages)
BT420	Li-Ion battery pack Victoria Combo
AL320	Victoria Combo AC/DC adapter
CA110	Mains cord Victor/Victoria
CAETH	Ethernet Data Cord
CAETHX	Ethernet Data Crossed Cord
CSTYL	Stylus

### Options

C10FEC	In-band G.707 FEC
C10SC	SC replacing FC-PC
C10ST	ST replacing FC-PC

**NOTE:** Other configurations for 2.5Gbit/s and combined 10Gbit/s-2.5Gbit/s applications are also available.



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