SUNRISE TELECOM

SunSet® 10G

INTERNATIONAL VERSION
March 2002

SPECIFICATIONS

Connectors

9.9 Gbit/s: FCUPC (SM-F) or SCUPC (SM-F)
2.5 Gbit/s, 622 Mbit/s, 155 Mbit/s (optional): FCUPC (SM-F) or SCUPC (SM-F)
External Clock: Bantam 100Ω, 1.544 Mbit/s (SONET), 2.048 Mbit/s or 2.048 MHz (SDH)

Optical Transmitters

Complies to ITU-T G.691, G.957, Telcordia GR-253-CORE (September 2000 issue)
9.9 Gbit/s
- 1310 nm Short Reach output power: -3 dBm typical
- 1550 nm Short Reach output power: -3 dBm typcial
- 1550 nm Intermediate Reach output power: 0 dBm typcial
- Laser Safety: IEC825-1, Class 1, 21 CFR 1040.10 & 1040.11

2.5 Gbit/s, 622 Mbit/s, 155 Mbit/s
- 1310 nm Short Reach output power: -10 to -8 dBm
- 1310 nm Long Reach output power: -3 to +2 dBm
- 1550 nm Long Reach output power: -3 to +2 dBm
- Laser Safety: IEC825-1, Class 1, 21 CFR 1040.10 & 1040.11

Clock Source
- Internal: ±4.5 ppm
- Loop: Recovered, ±300 ppm
- External: 1.544 Mbit/s (BITS) or 2.048 MHz (SETS) conforming to ITU-T G.703

Framing: Conforms to ANSI T1.105, Telcordia GR-253, & ITU-T G.707
Line Coding: NRZ
Test Patterns
- 155 Mbit/s & 622 Mbit/s Test Patterns: 2^{23}-1, 2^{20}-1, 2^{15}-1, 2047, All 1s, All 0s, Alt 1010, Alt 1100
- 2.5 Gbit/s Test Patterns: 2^{31}-1, 2^{23}-1, All 1s, All 0s, Alt 1010, Alt 1100
- 9.9 Gbit/s Test Patterns: 2^{31}-1, 2^{23}-1, All 1s, All 0s, Alt 1010, Alt 1100
- 10 Programmable User Patterns defined up to 16 bits
- Test pattern inversion

Optical Receivers

Complies to ITU-T G.691, G.957, Telcordia GR-253-CORE (September 2000 issue)
9.9 Gbit/s
- Wavelength: 1300 to 1575 nm
- Range
  - 1310 nm Short Reach: -15.5 to +2 dBm
  - 1550 nm Short Reach: -15.5 to +2 dBm
  - 1550 nm Intermediate Reach: -17.5 to 0 dBm
- Maximum input power: 0 dBm

2.5 Gbit/s, 622 Mbit/s, 155 Mbit/s
- Wavelength: 1100 to 1600 nm
- Range: -28 to -8 dBm
- Maximum input power: -6 dBm

Test Modes

Point-to-point: Tx and Rx are set to the same rate
MuxTest: The test pattern is generated on the low or high speed port and the BERT is measured on the opposite port

SDH (ITU-T G.707)

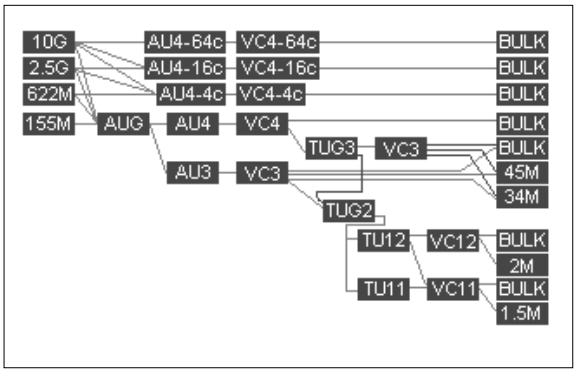

Figure 1

Rates: 9.9 Gbit/s, 2.5 Gbit/s, 622 Mbit/s, 155 Mbit/s
Payloads: VC4-64c, VC4-16c, VC4-4c, VC4 Bulk, VC3 Bulk, 45M, 34M, 2M Async, 1.5M Async, VC12 Bulk, VC11 Bulk
ITU-T mapping
Error Injection: B1, B2, B3, FASE, MS-REI, HP-REI, LP-REI, BIP-2, and Bit
Error Injection Count: Programmable error burst of 1 to 9999
Error Injection Rate: 2 x 10^{-3} to 1 x 10^{-9}

. . . a step ahead

Alarm Generation: LOS, LOF, OOF, RS-TIM, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, HP-UNEQ, HP-PLM, HP-TIM, LP-RDI, LP-RFI, LP-PLM, LP-UNEQ, LP-TIM
Results Measurements
Errors: Bit, B1, B2, B3, FASE, MS-REI, HP-REI, LP-REI, BIP-2
Alarms: LOS, LOF, OOF, RS-TIM, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, HP-UNEQ, HP-PLM, HP-TIM, LP-RDI, LP-RFI, LP-PLM, LP-UNEQ, LP-TIM
Performance: G.821, G.826, G.828, G.829, M.2100/2110/2120
SDH Pointer: Justification, Increase, Decrease

SONET (Telcordia GR-253-CORE)

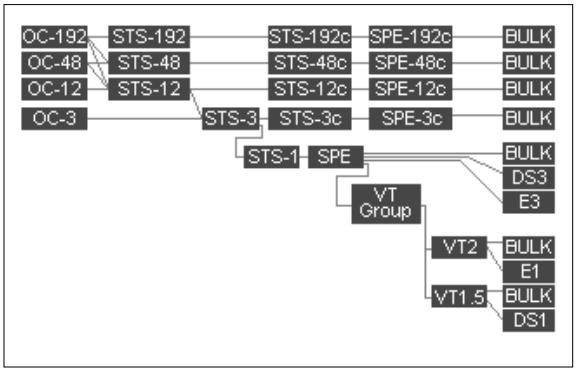

Figure 2

Rates: OC-192, OC-48, OC-12, OC-3
Payloads: STS-192c, STS-48c, STS-12c, STS-3c, STS-1, DS3, E3, VT2 Bulk, E1 Async, VT1.5 Bulk, DS1 Async
Error Injection: B1, B2, B3, Frame, REI-L, REI-P, REI-V, and Bit
Error Injection Count: Programmable error burst of 1 to 9999
Error Injection Rate: 2 x 10^{-3} to 1 x 10^{-9}
Alarm Generation: LOS, LOF, AIS, LOP, AIS-L, RDI-L, AIS-P, RDI-P, PLM-P, TIM-P, UNEQ-P, AIS-V, RDI-V, LOP-V, PLM-V, TIM-V, UNEQ-V, LOM
Results Measurements
G.821 Bit Performance: FC (failure counts), BER, LOPS (loss of pattern sync), %LOPS, SEFS (severely errored frame seconds), %SEFS, ES (errored seconds), %ES, SES (severely errored seconds), %SES, UAS (unavailable seconds), %UAS, EFS (error free seconds), %EFS
SONET defects: LOS, LOF, AIS, LOP, AIS-L, RDI-L, AIS-P, RDI-P, PLM-P, TIM-P, UNEQ-P, AIS-V, RDI-V, LOP-V, PLM-V, TIM-V, UNEQ-V, LOM, B1, B2, B3, Frame, REI-L, REI-P, REI-V, FC (failure counts), SEFS (severely errored frame seconds), %SEFS, ES (errored seconds), %ES, SES (severely errored seconds), %SES, UAS (unavailable seconds), %UAS, EFS (error free seconds), %EFS
SONET Pointer: Justification, Increase, Decrease

Measurements Common to SDH/SONET

General
Continuous measurement
Elapsed time, remaining time
Optical power level measurement
Frequency: Received, Maximum and Minimum (frequency deviation in ppm, ± Wander)
Propagation Delay

SDH/SONET Overhead

Monitor and Transmit Section/Regenerator Section, Line/Multiplexer Section, and Path overhead bytes
ASCII decode of 16-byte or 64-byte STS/HP or VT/LP Path Trace bytes (J1/J2)
Programming K1/K2 APS signaling bytes per ITU-T G.783/G.841
J0 Section Trace Generation: 16 bytes E.164 ASCII sequence + CRC-7
S1 Synchronization Status Messages decode & generation
Path Overhead Monitor
Programming of Path Overhead bytes
J1/J2 Path Trace Generation: 16 bytes E.164 ASCII sequence + CRC-7 or 64 bytes E.164 ASCII sequence
DCC BER testing through D1 to D3 bytes or D4 to D12 bytes
Pattern selection 2^{23}-1, 2^{20}-1, 2^{15}-1, 2^{11}-1
C2 signal label byte programming in binary or hexadecimal
G1 bit 5: RDI generation
User programmable path user bytes (F2, F3)
Programmable K3 (24), K4 (27) bytes (bits 1-4) for APS signaling
V5 byte: Signal label generation (bits 5-7)
Pointer Monitor: H1, H2, V1, and V2 bytes
Pointer Adjustment: Programming of pointer value, NDF and SS bits
Pointer Test Control
Modes: Single , burst of 2-8 consecutive justifications
Select Increment, decrement or alternate the pointer value
Pointer Test Sequences per G.783
APS Timing Measurement
Resolution: 1 ms
Sensors: LOF, L-AIS/MS-AIS, P-AIS/AU-AIS, B1 and B2 errors
Pass/Fail Indicator
User selectable switch and gate time

PDH/T-carrier (inside SDH/SONET)

Bit rates: 1.544, 2.048, 34.368, and 44.736 Mbit/s mapped into VC11, VC12, VC3/VT1.5, VT2, STS-1SPE (per Figures 1 and 2)
Framing
1.5M, Nx56, Nx64: Unframe, ESF, SF-D4
2M, Nx64: Unframe, PCM-30/30C, PCM-31/31C
34M: Unframe, Frame
45M: Unframe, M13, C-bit
Error injection
1.5M: Bit, Frame, CRC-6
2M: Bit, FAS, CRC-4, E-bit
34M: Bit, FAS
45M: Bit, Frame, P-bit, C-bit, FEBE
Alarm generation
1.5M: AIS, Yellow, Idle
2M: AIS, FAS RAI, MFAS RAI
34M: AIS, FAS RAI
45M: AIS, Yellow, Idle
Measurements: Alarms, Errors, ITU-T G.821 analysis

GENERAL

Display: 320 x 480 pixel color
Soft LEDs on display: Signal, Alarm, Frame, Errors, Pointer
Rubber keypad
Network: 10/100Base-T RJ-45
Serial Port: RS232C (V.24), RJ-11 connector
DC Power for battery charger and continuous operation
Operating temperature: 0°C to 40°C [32°F to 104°F]
Storage temperature: -20°C to 70°C [-4°F to 158°F]
Operating humidity: 5% to 90% noncondensing
Size: 11 x 9 x 28.5 cm [4.25 x 3.5 x 11 in]
Weight: 1.8 kg [4 lbs]
Battery: Built-in Li-Ion rechargeable field replaceable battery pack

ORDERING INFORMATION

Test Set

SS10G-W	STM-64/OC-192 SDH/SONET Test Set 1550 nm Short Reach Tx/Rx. FCUPC connector standard. For other options see Connector Options and SS10G-W Optics Options.
SS25G-W	STM-1/4/16 OC-3/12/48 SDH/SONET Test Set Long Reach Rx, 1310 nm Short Reach Tx. DCUPC connector standard. Factory Upgradeable to 10 Gbit/s. For other options see Connector Options and STM-1/4/16 Optics Options.

Configuration includes: User's Manual (SS10G-101), AC Power Adapter (SA140), Internal Li-Ion battery (SA130), and Rubber Holster (SS10G-RH). Please specify power cord: SA155-EU for Europe, SA155-NA for North America, SA155-UK for United Kingdom.

Hardware Options

All hardware options must be specified at time of order

Connector Options

SS10G-SC	Replaces FCUPC connectors with SCUPC connectors for all Tx/Rx

SS10G-W Optics Options

SS10G-13SR	Replaces 10 Gbit/s 1550 nm Short Reach Tx/Rx with 1310 nm Short Reach Tx/Rx
SS10G-15IR	Replaces 10 Gbit/s 1550 nm Short Reach Tx/Rx with 1550 nm Intermediate Reach Tx/Rx
SS10G-25-W	Adds STM-1/4/16 interfaces to SS10G-W Test Set Includes 2.5 Gbit/s, 622 and 155 Mbit/s rates with 1310 nm Short Reach Tx, Long Reach Rx. For other options see STM-1/4/16 Optics Options.

STM-1/4/16 Optics Options (Applies to SS25G-W & SS10G-25-W)

SS10G-25-13LR	Replaces 2.5 Gbit/s, 622 and 155 Mbit/s 1310 nm Short Reach Tx with 1310 nm Long Reach Tx. See Note 1.
SS10G-25DW-1-W	Replaces 2.5 Gbit/s, 622 and 155 Mbit/s 1310 nm Short Reach Tx with Dual Wavelength 1310 nm Short Reach Tx, 1550 nm Long Reach Tx. See Note 1.
SS10G-25DW-3-W	Replaces 2.5 Gbit/s, 622 and 155 Mbit/s 1310 nm Short Reach Tx with Dual Wavelength 1310 nm Long Reach Tx & 1550 nm Long Reach Tx. See Note 1.

Note 1: These options are mutually exclusive.

Calibration Options

SS10GCC	Certificate of Calibration and Compliance *Available at no charge when specified at time of order*
SS10GCCM	Certificate of Calibration and Compliance with Measurement Data when specified at time of order

Optical Cables and Adapters

SA501	Optical Cable; FC-PC to FC-PC, 2 m
SA502	Optical Cable; FC-PC to SC, 2 m
SA503	Optical Cable; FC-PC to ST, 2 m
SA511	Optical Cable; SC to SC, 2 m
SA512	Optical Cable; SC to ST, 2 m
SA521	Optical Attenuator; FC-PC, -10 dB
SA531	Optical Attenuator; SC, -10 dB
SA541	Optical Splitter; FC-PC, 90/10
SA545	Optical Splitter; FC-PC, 50/50
SA551	Optical Splitter; SC, 90/10
SA555	Optical Splitter; SC, 50/50

Electrical Cables and Adapters

SS106	Cable, Single Bantam (m) 120Ω to Single Bantam (m), 120Ω, 2 m
SS108	Cable, Single Bantam (m) 120Ω to Single 310 (m), 2 m
SS109	Cable, Single Bantam (m) 120Ω to Alligator Clips, 2 m
SS212	Cable, Single Bantam (m) 120Ω to BNC 75Ω

Accessories

SS10G-HC	Hard Carrying Case
SS101	Carrying Case (soft)
SS117A	Printer Paper, 5 rolls, for SS118B/C
SS118B	High Capacity Thermal Printer. With internal rechargeable battery. Includes cable (SS115D) for connection to SunSet and 110 VAC charger.
SS118C	High Capacity Thermal Printer. With internal rechargeable battery. Includes cable (SS115D) for connection to SunSet and 220 VAC charger.
SS122B	Null Modem Adapter. DB9 (f) to DB9 (f) with Full Handshaking.
SS122C	Null Modem Adapter. DB25 (f) to DB25 (f) with Full Handshaking.
SS144	Printer Cable, 6-pin RJ11 to DB-9 (m). Provided at no charge when SS118B/C is ordered.
SS144A	Printer Cable, 6-pin RJ11 to DB-25 (m). Provided at no charge when SS118B/C is ordered.

Replacement

SA130	High Capacity Li-Ion Battery Pack for SunSet 10G
SA140	SS10G AC adapter, 100 to 240V AC, 50-60 Hz input, 15 VDC @ 5A
SA155-EU	3-prong power cord for use in Europe
SA155-NA	3-prong power cord for use in North America and Asia
SA155-UK	3-prong power cord for use in United Kingdom

SS10G-101	User's Manual *Available at no charge with purchase of the SunSet 10G.*
SS10G-RH	Rubber Holster *Available at no charge with purchase of the SunSet 10G.*

Upgrade Options (See Note 2)

RE052	Adds 2.5G 1310 nm Short Reach Tx, Long Reach Rx to SS10G
RE053	Adds 2.5G 1310 nm Long Reach Tx/Rx to SS10G
RE055	Adds 2.5G Dual Wavelength 1310 nm Short Reach Tx, 1510 nm Long Reach Tx, Long Reach Rx to SS10G
RE057	Adds 2.5G Dual Wavelength 1310 nm Long Reach Tx, 1510 nm Long Reach Tx, and Long Reach Rx to SS10G
RE058	Adds 10G 1310 nm Short Reach Tx/Rx to SS25G
RE059	Adds 10G 1550 nm Short Reach Tx/Rx to SS25G
RE060	Adds 10G 1550 nm Intermediate Reach Tx/Rx to SS25G

Note 2: All units must be returned to the factory for these hardware upgrades.

Note: Performance Objectives subject to change without notice.

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