SUNRISE TELECOM

# SunSet® SDH

STM-16 version
May 2004

## SDH SPECIFICATIONS

### Connectors
FCUPC (SSSDHC16-FC), SCUPC (SSSDHC16-SC)

### 2.5G/622M/155M/52M (STM-16/4/1/0) Optical
#### *Transmitter*
Bit rates 2.5 Gbit/s, 622 Mbit/s, 155 Mbit/s, 52 Mbit/s: ± 4 ppm
Frequency Offset
- 2.488 Gbit/s ± 50 ppm in 1, 10 ppm steps
- 622.080 Mbit/s ± 50 ppm in 1, 10 ppm steps
- 155.520 Mbit/s ± 50 ppm in 1, 10 ppm steps
- 51.840 Mbit/s ± 50 ppm in 1, 10 ppm steps

Range
- 1310 nm Short Reach output power: -10 to -3 dBm
- 1310 nm Long Reach output power: -2 to +3 dBm
- 1550 nm Long Reach output power: -2 to +3 dBm

Laser Safety: IEC825-1, Class 1, 21 CFR 1040.10 & 1040.11
Clock Source
- Internal: ± 4 ppm
- Loop: Recovered from received signal
- External: 2.048 Mbit/s or 2.048 MHz, 1.544 Mbit/s or 1.544 MHz

Line Coding: NRZ
Payloads
- VC4-16c Bulk, VC4-4c Bulk, VC4 Bulk, VC3 Bulk, VC12 Bulk, VC11 Bulk, 139M, 45M, 34M, 2M Async, 1.5M Async
- Framed, Unframed, Structured PDH payloads

#### *Receiver*
Wavelength: 1280 -1580 nm
Range: -27 to -9 dBm
Maximum Input Power: -6 dBm typical

### 155M Electrical (STM-1)
#### *Transmitter*
Clock Source
- Internal
  - Bit rate: 155.520 Mbit/s ± 4 ppm
  - Frequency offset: 155.520 Mbit/s ± 150 ppm in 1, 10, 100 ppm steps
- Loop: Recovered from received signal
- External: Synchronization to external 1.544 MHz or 2.048 MHz via 1.5/2M External Clock input
- 1.5/2M-L2-Rx: Synchronization to external 1.544 Mbit/s or 2.048 Mbit/s via 1.5/2M Line 2 input

Pulse Shape: 155M electrical conforms to ITU-T G.703
Line Coding: CMI
Port/Connector: 75Ω unbalanced BNC (f)
Framing: Conforms to ITU-T G.707
Mapping: Conforms to ITU-T G.707
Payloads
- VC4 Bulk, VC3 Bulk, VC12 Bulk, VC11 Bulk, 139M, 45M, 34M, 2M Async, 1.5M Async
- Framed, Unframed, Structured PDH payloads

#### *Receiver*
Input Sensitivity
- Terminate: 12.7 dB cable loss
- Monitor: 20 dB resistive loss plus 6 dB cable loss

Clock Recovery Range: 155.520 Mbit/s ± 150 ppm
Jitter Tolerance to ITU-T G.825
Impedance
- Terminate: 75Ω, unbalanced

Port/Connector: 75Ω, unbalanced BNC (f)

### 52M Electrical, STM-0 (SWSDH-120)
#### *Transmitter*
Clock Source
- Internal
  - Bit rate: 51.840 Mbit/s ± 5 ppm
  - Frequency offset: 51.840 Mbit/s ± 500 ppm in 1, 10, 100 ppm steps
- Loop: Recovered from received signal

Pulse Shape: Conforms to ITU-R F.750-3
Line Coding: B3ZS
Framing: Conforms to ITU-T G.707 Annex A
Mapping: Conforms to ITU-T G.707
Payloads: VC3 Bulk, VC12 Bulk, VC11 Bulk, 45M, 2M Async, 1.5M Async
Port/Connector: 75Ω, unbalanced BNC (f)

#### *Receiver*
Clock Recovery Range: 51.840 Mbit/s ± 500 ppm
Input Sensitivity
- Terminate: 10.8 dB cable loss
- Monitor: +3 to -26 dB resistive loss

Impedances: 75Ω, unbalanced (f)
Port/Connector: 75Ω, unbalanced BNC (f)

### Test Pattern Generator
STM-16 (VC4-16c): 2e31, 2e23, 2e20, 2e15, 2e11, All 0s, All 1s, Alt 1010, 1-8, 1-16
STM-16 (VC4-4c and below): 2e23, 2e20, 2e15, 2e11, All 0s, All 1s, Alt 1010, 1-8, 1-16
STM-4, STM-1, STM-0: 2e23, 2e20, 2e15, 2e11, All 0s, All 1s, Alt 1010, 1-8, 1-16
10 User Patterns defined up to 16 bits
Test Pattern Inversion
Unselected Channels: Unequipped, Broadcast


*. . . a step ahead*

# SunSet® SDH

## SDH Error Injection/Alarm Generation

Errors
- Bit, B1, B2, B3, MS-REI, HP-REI, LP-REI, BIP-2
- Programmable error burst 1 to 9999 count, or error rate $2x10^{-3}$ to $1x10^{-9}$
- FAS error injection in periodic mode (burst of M errors every N frames)

Alarms
- LOS, LOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, HP-UNEQ, TU-AIS, TU-LOM, LP-UNEQ, TU-LOP, HP-PLM, LP-PLM, LP-RFI, LP-RDI, RS-TIM, HP-TIM, LP-TIM
- Enhanced RDI [HP/LP-SRDI (Server), HP/LP-CRDI (Connectivity), HP/LP-PRDI (Payload)]
- Alarm generation in continuous or repetitive mode (burst of M frames out of N frames)

## SDH Measurements (2.5G, 622M, 155M, 52M)

Errors: Bit, B1, B2, B3, BIP-2, MS REI, HP REI, LP REI

Alarms: LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-RDI, HP-UNEQ, TU- AIS, TU-LOM, LP-UNEQ, TU-LOP, HP-TIM, LP-TIM, HP-PLM, LP-PLM, LP-RFI, LP-RDI, Enhanced RDI [HP/LP-SRDI (Server), HP/LP-CRDI (Connectivity), HP/LP-PRDI (Payload)], Extended PLM (LP-EPLM), Extended LOM (LP-ELOM)

Performance: ITU-T G.821, G.826, G.828, G.829, M.2100/M.2101/M.2110 (Maintenance or BIS)

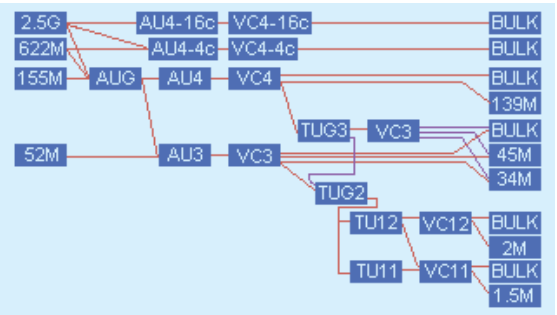
Optical Power Level Measurement
- Range: -8 to -21 dBm
- Accuracy: ± 1 dBm
- Optical Reception Saturation Indication

Frequency Measurements (test interface and payload): Moving bar graph of slip count, max frequency, min frequency, frequency deviation in ppm, clock slips, max positive wander, max negative wander

Automatic Tributary Scan: 80 characters/line report of alarms/errors per tributary. In-service and out-of-service for 1.5M, 2M, 34M, 45M, 139M, VC3 Bulk, and VC4 Bulk inside STM1/4/16 with full report.

## SDH Features

ITU-T and ETSI mapping
- Manual and Graphic configuration




Overhead Monitoring and Decoding
- Text encoding of all applicable bytes (K1, K2, S1, C2, etc.)
- Full SOH/POH Overhead bytes control in binary or HEX format

Programming K1, K2 APS signalling bytes per ITU-T G.783

Through Modes
- Line Through
- Payload Through
  - All SOH bytes can be modified except for B1, B2, H1, H2 bytes
  - Alarms/Error Insertion: LOS, LOF, MS-AIS, MS-RDI, B1, B2, MS-REI

Trace Generation
- J0 Section Trace/Generation: 1 byte SAPI format or 16 bytes E.164 ASCII + CRC-7
- J1/J2 Path Trace/Generation: 16 bytes E.164 ASCII sequence + CRC-7 or 64 bytes E.164 ASCII sequence
- Through Mode for J0, J1, J2 bytes
- Stores up to 5 traces per byte with alphanumeric labels
- Programmable Expected Trace Data for J0, J1, and J2 bytes

Path Overhead Monitoring and Decoding
- Text encoding of all applicable bytes (K1, K2, S1, C2, etc.)

Programmable POH bytes

DCC BER Testing through D1 to D3, D4 to D12 bytes

Orderwire: Talk/listen through E1, E2 bytes

Pointer Monitor
- AU (bytes H1 and H2), TU (bytes V1 and V2)
- Display number of pointer operations with respect to time
  - Instantaneous pointer value display
  - Graphical display of pointer movements with histogram format

Pointer Adjustment
- Programming of pointer value, NDF and ss bits
- Increase and decrease the pointer value

SONET Mode: Setting ss bits to generate/detect SONET signal

## SDH-PDH Mux/Demux Testing

Using two sets of physical ports: 2 Tx/2 Rx

The following combinations are applicable:

| | | |
|---|---|---|
| • 2.5G 0/139M | • 622M 0/139M | • 155M 0/139M |
| • 2.5G 0/45M | • 622M 0/45M | • 155M E (0)/45M |
| • 2.5G 0/34M | • 622M 0/34M | • 155M E (0)/34M |
| • 2.5G 0/2M | • 622M 0/2M | • 155M E (0)/2M |
| • 2.5G 0/1.5M | • 622M 0/1.5M | • 155M E (0)/1.5M |

MuxTest: The test pattern is generated on the low or high speed port and the BERT is measured on the opposite port

MuxMode: Emulation of a mux for 1.5M/2M payloads only

## SDH-SDH Mux/Demux Testing (SWSDH-116)

The following combinations are applicable:

| | | |
|---|---|---|
| • 2.5G 0/622M 0 | • 622M 0/155M E (0) | • 155M E (0)/52M E |
| • 2.5G 0/155M E (0) | • 622M 0/52M E | |
| • 2.5G 0/52M E | | |

## G.783 Pointer Test Sequences (SWSDH-123)

AU or TU pointer

Sequences: Single, Burst, Phase, Transient Burst, Periodic, 87-3, 26-1, Opposite (Increase + Decrease), and Custom

Movement: Increase, Decrease, Increase + Decrease

Anomalies: Added, Cancel, and None

## Tandem Connections Monitoring (SWSDH-125)

N1 byte for High Order Paths (VC-3/VC-4)

N2 byte for Low Order Paths (VC-11/VC-12)

Analysis of data, display of data in the form of alarms, performance figures, and APId messages as specified in ITU-T Rec. G.707.

Generation and Detection of the following parameters:
- Loss of Tandem Connection (LTC)
- Loss of Multiframe (LOM)
- Incoming Error Count (IEC)
- Tandem Connection Remote Error Indication (TC-REI)
- Tandem Connection Alarm Indication Signal (TC-AIS)

Tandem Connection Remote Defect Indication (TC-RDI)
Tandem Connection Outgoing Defect Indication (TC-ODI)
Tandem Connection Outgoing Error Indication (TC-OEI)
Tandem Connection UnEquip (TC-UNEQ)
Tandem Connection Errors Difference (TC-DIFF)
Graphical Display

### APS Timing Measurement (SWSDH-126)

Measures time that anomaly is present
Resolution: 1 ms
Anomaly selection: MS-AIS, B2 errors, AU-AIS, TU-AIS, LOS
Selectable switch time to display PASS or FAIL
Selectable gate time to control the minimum interval for the circuit to be anomaly time
APS timing at 2M interfaces: 2M-AIS, 2M-LOS
APS bytes capture
Capture and decode states of K1/K2 bytes
– Store hundreds of messages
– Ring and Linear Decoding
125 μs resolution
Optional Trigger with wildcards
Timestamp in frames or ms
Duration in absolute or elapsed time
Save or Print results
Load and Decode past results
Service disruption (bulk payloads)

### Propagation Delay Measurement

Round trip signal transmission delay
Range: From 1 μs to 5 seconds
Measures in μs and UI (Unit Intervals)

## PDH SPECIFICATIONS

### 139M (SWSDH-112)

#### *Transmitter*

Clock Source
Internal
– Bit rate: 139.264 Mbit/s ± 5 ppm
Frequency offset (as test interface and as a payload): 139.264 Mbit/s ± 150 ppm in 1, 10, 100 ppm steps
Loop: Recovered from received signal
Pulse Shape: Conforms to ITU-T G.703
Line Coding: CMI
Port/Connector: 75Ω, unbalanced BNC (f)
Framing: Unframed, Framed, Structured per ITU-T G.751
Error Injection: Code, Bit, Bit+Code, FAS
Programmable error burst 1 to 9999 count or error rate 2 x $10^{-3}$ to 1 x $10^{-9}$
Alarm Generation: AIS, FAS RAI

#### *Receiver*

Clock Recovery Range: 139.264 Mbit/s ± 150 ppm
Input Sensitivity
Terminate: 12 dB cable loss
Monitor: 20 dB resistive loss plus 6 dB cable loss
Jitter Tolerance: Conforms to ITU-T G.823
Impedance
Terminate: 75Ω, unbalanced
Port/Connector: 75Ω, unbalanced BNC (f)

### 45M (SWSDH-111)

#### *Transmitter*

Clock Source
Internal
– Bit rate: 44.736 Mbit/s, ± 5 ppm
Frequency offset (as test interface and as a payload): 44.736 Mbit/s ± 500 ppm in 1, 10, 100 ppm steps
Loop: Recovered from received signal
Line Coding: B3ZS
Pulse Shape: Conforms to ITU-T G.703
Port/Connector: 75Ω, unbalanced BNC (f)
Framing: Unframed, M13, and C-bit
Error Injection: Code, Bit, Code+Bit, Frame, C-bit, P-bit, FEBE
Programmable error burst 1 to 9999 count, or error rate 2 x $10^{-3}$ to 1 x $10^{-9}$
Alarm Generation: AIS, Yellow, Idle

#### *Receiver*

Clock Recovery Range: 44.736 Mbit/s ± 500 ppm
Jitter Tolerance: Conforms to ITU-T G.824
Input Sensitivity
Terminate: Up to -6 dB cable loss
Monitor: +6 dB to -26 dB resistive loss
Impedance
Terminate, Monitor: 75Ω, unbalanced
Port/Connector: 75Ω, unbalanced BNC (f)

### 34M

#### *Transmitter*

Clock Source
Internal
– Bit rate: 34.368 Mbit/s ± 5 ppm
Frequency offset (as test interface and as a payload): 34.368 Mbit/s ± 500 ppm in 1, 10, 100 ppm steps
Loop: Recovered from received signal
Line Coding: HDB3
Pulse Shape: Conforms to ITU-T G.703
Framing: Framed, Unframed, Structured per ITU-T G.751
Error Injection
Code, Bit, Bit+Code, FAS
Programmable error burst 1 to 9999 count, or error rate 2 x $10^{-3}$ to 1 x $10^{-9}$
Alarm Generation: AIS, FAS RAI
Port/Connector: 75Ω, unbalanced BNC (f)

#### *Receiver*

Clock Recovery Range: 34.368 Mbit/s ± 500 ppm
Jitter Tolerance: Conforms to ITU-T G.823
Input Sensitivity
Terminate: -12 dB cable loss
Monitor: -20 dB resistive loss plus -12 dB cable loss
Impedance: 75Ω, unbalanced
Port/Connector: 75Ω, unbalanced BNC (f)

### Dual 2M

#### *Transmitters (Lines 1 and 2)*

Clock Source
Internal
– Bit rate: 2.048 Mbit/s ± 5 ppm
Frequency offset (as test interface and as a payload): 2.048 Mbit/s ± 5000 ppm in 1, 10, 100, 1000 ppm steps
External Clock Input Port: 2.048 MHz

Recovered from Line 2 input (2.048 Mbit/s)
Loop: Recovered from received signal
Line Coding: AMI, HDB3
Pulse Shape: Conforms to ITU-T G.703 for balanced (120Ω) interfaces
Port/Connector
120Ω: balanced RJ-45 (f) (SSSDHC16-RJ45)
120Ω (SSSDHC-A): balanced, Bantam (SSSDHC16-BTM)
Framing: Unframed, PCM-30, PCM-30C, PCM-31, PCM-31C conforms to ITU-T G.704
Error Injection
Code, Bit, Bit+Code, CRC-4, E-bit, FAS
Programmable error burst 1 to 9999 count or error rate $2x10^{-3}$ to $1x10^{-9}$
Alarm Generation: AIS, FAS RAI, MFAS RAI
Fractional E1
Error measurements, channel configuration verification
N or M (noncontiguous) x64 kbit/s, N=1 to 31
Set Tx and Rx channels independently
Through Mode: Test pattern on selected channels; all others through

### *Receivers (Lines 1 and 2)*

Clock Recovery Range: 2.048 Mbit/s ± 5000 ppm
Jitter Tolerance: Conforms to ITU-T G.823
Input Sensitivity
Terminate, Bridge: +6 to -43 dB with ALBO
Monitor: -20 dB resistive loss plus -6 dB cable loss
Impedance
Terminate, Monitor: 120Ω balanced
Bridge: > 750Ω
Port/Connector
120Ω: balanced RJ-45 (f) (SSSDHC16-RJ45)
120Ω (SSSDHC-A): balanced, Bantam (SSSDHC16-BTM)

## Dual 1.5M (SWSDH-110)

### *Transmitters (Lines 1 and 2)*

Clock Source
Internal
– Bit rate: 1.544 Mbit/s ± 5 ppm
Frequency offset (as test interface and as a payload): 1.544 Mbit/s ± 500 ppm in 1, 10, 100 ppm steps
External Clock Input Port: 1.544 MHz
Recovered from Line 2 input (1.544 Mbit/s)
Loop: Recovered from received signal
Line Coding: AMI, B8ZS
Pulse Shape: Conforms to ITU-T G.703
Port/Connector
100Ω, balanced RJ-45 (f) (SSSDHC16-RJ45)
100Ω (SSSDHC-A): balanced, Bantam (SSSDHC16-BTM)
Framing: Unframed, SF-D4, ESF. Conforms to ANSI T1.102, 107, 107A, 403, and 404. Also Telcordia TR-TSY-000009 and TR-TSY-000191.
Error Injection
BPV, Logic, Logic+BPV, CRC-6, Frame
Programmable error burst 1 to 9999 count or error rate $2x10^{-3}$ to $1x10^{-9}$
Alarm Generation: AIS, Yellow, Idle
Fractional T1
Error measurements, channel configuration verification
Nx64 kbit/s, Nx56 kbit/s, N=1 to 24
Set Tx and Rx channels independently
Through Mode: Test pattern on selected channels; all others through

### *Receivers (Lines 1 and 2)*

Clock Recovery Range: 1.544 Mbit/s ± 500 ppm
Jitter Tolerance: Conforms to ITU-T G.824
Input Sensitivity
Terminate, Bridge: +6 to -36 dB cable loss
Monitor: -15 to -25 dB, resistive loss
Impedance
Terminate, Monitor Mode: 100Ω, balanced
Bridge: > 750Ω
Port/Connector
100Ω, balanced RJ-45 (f) (SSSDHC16-RJ45)
100Ω (SSSDHC-A): balanced, Bantam (SSSDHC16-BTM)

## Test Pattern Generator

2e23, 2e20, 2e15, 2e11, 2e9, 2e7, 2e6, All 0s, All 1s, Alt 1010, 20ITU, QRS, 1-8, 1-16, 3-24
10 User Patterns defined up to 32 bits
Test Pattern Inversion

## PDH/T-Carrier Measurements (139M, 45M, 34M, 2M, 1.5M)

Error Type
Code, bit, FASE (2M, 8M, 34M, 139M)
CRC-4, E-bit (2M)
Code (BPV), F-bit, P-bit, C-bit, FEBE, CRC-6 (1.5M, 45M)
Typical Error Type Reports: Total error count, error rate, ES, %ES, SES, %SES, UAS, %UAS, EFS, %EFS, AS, %AS
ITU-T G.821 Analysis
ITU-T G.826 Analysis: Based on anomalies, defects, far end indications
M.2100 Analysis (Maintenance or BIS)
Alarm Statistics
Loss of signal seconds, Loss of Frame seconds, AIS seconds
FAS RAI seconds (2M, 34M, 139M)
MFAS RAI seconds (2M only)
Yellow alarm seconds (1.5M, 45M)
Low density seconds, excess 0s seconds (1.5M)
Frequency Measurements: Moving bar graph of slip count, max frequency, min frequency, frequency deviation in ppm, clock slips, max positive wander, max negative wander
Signal Level Measurement (1.5/2M/34M/45M)

## PDH Mux/Demux Testing (SWSDH-113)

Using two sets of physical ports: 2 Tx/2 Rx
The following combinations are applicable:

- 139M/34M
- 45M/2M
- 34M/2M
- 139M/2M
- 45M/1.5M

MuxTest: The test pattern is generated on the low or high speed port and the BERT is measured on the opposite port

## Propagation Delay Measurement

Round trip signal transmission delay
Measures in µs and UI (Unit Intervals)

## Voice Frequency Testing (SWSDH-114)

Monitor speaker with volume control
Built-in microphone/speaker
Companding Law: A-law (2M); µ law (1.5M)
Programmable idle channel A, B (C, D) bits (1.5M)
ABCD bits transmit and monitor in selected channel (2M)

VF Level and Frequency Measurement
Level: +3 to -60 dBm, resolution 0.1 dBm
Frequency: 50 to 3950 Hz, resolution 1 Hz
VF Tone Generation
Variable tone: 50 to 3950 Hz @ 1 Hz step. +3 to -60 dBm @ 1 dBm
Peak Code and Coder offset measurements
Noise Measurements
Receiver Filters
2M: 3.1 kHz, Psophometric, 1010 Hz notch
1.5M: 3 kHz flat, C-message, C-notch

Printer: Report printing via serial port, RS-232 DIN-9
Network: 10Base-T DIN-9
Battery: Built-in NiMH rechargeable battery pack
Power: AC operation w/100 to 240 VAC, 50/60 Hz universal charger
Environmental
Operating temperature: 0 to 45°C
Storage temperature: -20 to 70°C
Humidity: 5% to 90% noncondensing
Size: 11 x 7 x 27 cm
Weight: 1.5 kg

# COMMON TO SDH/PDH/T-CARRIERS

### Auto Configuration
Single button configuration
Automatically scans all test interfaces for signal
Configures test set based on received signal. Sets rate, mapping, payload, and/or test pattern.

### Measurement Criteria
Test results/events storage and events log capability
Stores up to 20 test results or 800 errors or alarms events w/user definable labels; lock/unlock records, available to screen view or print
Stores up to 10 user configurations (profiles) with alphanumeric labels
Print on event can be enabled or disabled
Print at timed interval (settable from 2 min up to 999 hr 59 min)
Measurement duration continuous or timed (settable up to 999 hr, 59 min)
Elapsed time, remaining time
Programmable start date and time
Audible alarm: On/off switchable

### Histogram Analysis (SWSDH16-101)
Errors/Alarms/Pointer graphic display in real-time
Stores current results, last 60 days with 15 min resolution, last 72 hours with 1 min resolution, last 60 min with 1 second resolution
CSV format storage

### Status and Alarm Indicators
Power and low battery LED indicators
Pattern Sync and Bit Error
139M and STM-N (signal), Alarm, Frame, Errors, Pointer, ATM cell
8M, 34M and 45M (signal), Alarm, Frame, and Errors
1.5/2M-L2, Alarm, Errors
1.5/2M-L1, Alarm, Errors

### Protocols (optional)
GSM Voice and TRAU, GSM A-bis, V5.x Monitoring, Frame Relay, SS7 (TUP, ISUP, BSSAP [DTAP+MAP, BTNUP, SSUTR2]), ISDN (ETSI, DPNSS, DASS2, AUSSI), VF Call Analysis & Emulation over 1.5M and 2M, Frame Relay, ATM - Refer to respective protocol Specifications for further information.

# GENERAL

Upgrades: SW options upgradeable via software in-field cartridge replacement
Display: Backlit 320 x 240 pixels STN indoor/outdoor Color screen with CFL Backlight

# ORDERING INFORMATION

| | |
|---|---|
| SSSDHC-STM16 | SunSet SDHC STM-16, 2M, 34M, and 155M test interfaces. RS232C and 10Base-T ports. |

### Optics Options[1]

| | |
|---|---|
| SSSDHC16-NONE | Electrical only unit. (BNC) No optical Connectors |
| SS25G-13SR | Optical Interface, STM-0/1/4/16 1310 nm Short Reach |
| SS25G-13LR | Optical Interface, STM-0/1/4/16 1310 nm Long Reach |
| SS25G-15LR | Optical Interface, STM-0/1/4/16 1550 nm Long Reach |
| SS25G-13SR/15LR | Optical Interface, STM-0/1/4/16 1310 nm Short Reach 1550 nm Long Reach |
| SS25G-13LR/15LR | Optical Interface, STM-0/1/4/16 1310/1550 nm Long Reach |

### Optical Interface Connector Options[1]

| | |
|---|---|
| SSSDHC16-FC | FCUPC Optical Connectors |
| SSSDHC16-SC | SCUPC Optical Connectors |

### Electrical Interface Connector Options[1]

| | |
|---|---|
| SSSDHC16-RJ45 | 1.5/2M RJ45 Connectors |
| SSSDHC16-BTM | 1.5M/2M Bantam Connectors |

### Standard & Configurable Accessories Options

| | |
|---|---|
| SSSDHC-101 | SunSet SDH User's Manual |
| SA904 | Training CD [Available at no charge with purchase of SunSet SDH, when specified at time of order] |
| SS138E | SunSet AC Adapter, 100-240 VAC, 50/60 Hz, 3-prong input, Output 15 VDC @ 3.3A [Only for use with SunSets equipped with NiMH battery pack] |

***Power Cord*** [1]

| | |
|---|---|
| SA155-EU | 2-Prong power cord plus ground for use in Europe (Except UK) |
| SA155-NA | 3-prong power cord for use in Latin America, North America, and Asia |
| SA155-UK | 3-prong power cord for use in United Kingdom |

***Warranty*** [1]

| | |
|---|---|
| SSSDHC-W1 | Standard 1 year warranty |
| SSSDHC-W2 | Extends standard warranty to 2 years [Excludes Battery and Accessories, which are warranted for one-year] |
| SSSDHC-W3 | Extends standard warranty to 3 years (Standard for North America) [Excludes Battery and Accessories, which are warranted for one-year] |
| SSSDHC-W4 | Extends standard warranty to 4 years [Excludes Battery and Accessories, which are warranted for one-year] |

[1]Mutually exclusive options. Must select only one.

## Calibration Data Document

| | |
|---|---|
| SSSDHC-CCM | Certificate of Calibration and Compliance with Measurement Data<br>[Must be specified at time of order. Only a printout of the test record is provided.] |

## Software Packages

| | |
|---|---|
| SWSDH16-WIN-C | Windows Remote Control |
| SWSDH16-101 | Histogram Analysis |
| SWSDH-110 | 1.5 Mbps Testing |
| SWSDH-111 | 45 Mbps Testing |
| SWSDH-112 | 139 Mbps Testing |
| SWSDH-113 | PDH Mux-demux Testing |
| SWSDH-114 | Voice Frequency Testing |
| SWSDH-115 | VF Call Analysis & Call Emulation over 1.5M<br>[Includes User's Manual SSSDHC-101-8] |
| SWSDH-116 | SDH-SDH Mux/Demux Testing |
| SWSDH-120 | 52 Mbps Testing |
| SWSDH-123 | G.783 Pointer Test sequences |
| SWSDH-125 | Tandem Connections Monitoring |
| SWSDH-126 | APS Switching Timing |
| SWSDH-129 | 1.5 Mbps ATM Testing<br>[Includes User's Manual SSSDHC-101-3] |
| SWSDH-130 | 2 Mbps ATM Testing<br>[Includes User's Manual SSSDHC-101-3.] |
| SWSDH-131 | 45 Mbps ATM Testing<br>[Includes User's Manual SSSDHC-101-3] |
| SWSDH-132 | 34 and 155 Mbps ATM Testing<br>[Includes User's Manual SSSDHC-101-3] |
| SWSDH-133 | 622 Mbps ATM Testing<br>[Includes User's Manual SSSDHC-101-3] |
| SWSDH-134 | 2.5 Gbps ATM Testing<br>[Includes User's Manual SSSDHC-101-3] |
| SWSDH-140 | GSM Voice and TRAU Access Option<br>[Includes User's Manual SSSDHC-101-1] |
| SWSDH-141 | GSM A-bis<br>[Includes SSSDHC-101-1] |
| SWSDH-149 | V.5x Monitoring<br>[Includes User's Manual SSSDHC-101-2] |
| SWSDH-150 | 3 Timeslot V5.2 Monitoring<br>[Requires SWSDH-149] |
| SWSDH-160 | Frame Relay<br>[Includes User's Manual SSSDHC-101-7] |
| SWSDH-161 | Frame Relay NNI<br>[Requires SWSDH-160] |
| SWSDH-170 | SS7 over 2M Analysis<br>[Includes User's Manual SSSDHC-101-5] |
| SWSDH-171 | TUP Analysis ITU Standard<br>[Requires SWSDH-170] |
| SWSDH-172 | ISUP Analysis ITU Standard<br>[Requires SWSDH-170] |
| SWSDH-173 | ISUP Analysis Chinese Standard<br>[Requires SWSDH-170] |
| SWSDH-174 | ISUP Analysis Italian Standard<br>[Requires SWSDH-170] |
| SWSDH-175 | Mobile Application Part BSSAP (DTAP+MAP)<br>[Requires SWSDH-170] |
| SWSDH-176 | BTNUP Analysis<br>[Requires SWSDH-170] |
| SWSDH-177 | SS7 over 1.5M Analysis<br>[Includes User's Manual SSSDHC-101-5] |
| SWSDH-178 | ISUP Analysis ANSI Standard<br>[Requires SWSDH-170 or SWSDH-177] |
| SWSDH-179 | SSUTR2 French TUP R2<br>[Requires SWSDH-170] |
| SWSDH-180 | ISDN Monitoring & Call Emulation<br>[Includes User's Manual SSSDHC-101-6] |
| SWSDH-181 | ETSI (EuroISDN) Protocol<br>[Requires SWSDH-180] |
| SWSDH-182 | DPNSS Protocol<br>[Requires SWSDH-180] |
| SWSDH-183 | DASS2 Protocol<br>[Requires SWSDH-180] |
| SWSDH-184 | AUSSI Protocol<br>[Requires SWSDH-180] |
| SWSDH-ATM | ATM Software Package<br>[Includes SWSDH-130 and SWSDH-132] |
| SSSDHC-ATM | VC12 ATM Testing<br>[Hardware option to allow for 2M and VC12B payload for ATM STM 1/4/16 modes and VBR capability] |

## Optical Accessories

| | |
|---|---|
| SA501 | Optical Patch Cord, SMF, FC-PC to SC-PC, 6' |
| SA502 | Optical Patch Cord, SMF, FC-PC to SC-PC, 6' |
| SA503 | Optical Patch Cord, SMF, FC-PC to ST-PC, 6' |
| SA508 | Optical Patch Cord, LCUPC to SCUPC, 6' |
| SA509 | Optical Patch Cord, LCUPC to FCUPC, 6' |
| SA511 | Optical Patch Cord, SC to SC, 6' |
| SA512 | Optical Patch Cord, SC to ST, 6' |
| SA521 | Optical Attenuator, FC-PC, -10 dB |
| SA523 | Optical Connector Adapter, FC/PC to SC/PC |
| SA524 | Optical Connector Adapter SC/PC to FC/PC<br>[Changes a SC (f) appearance to a FC (f) appearance] |
| SA531 | Optical Attenuator, SC-PC, -10 dB |
| SA541 | Optical Splitter, FC-PC, 90/10 |
| SA545 | Optical Splitter, FC-PC, 50/50 |
| SA551 | Optical Splitter, SC-PC, 90/10 |
| SA555 | Optical Splitter, SC-PC, 50/50 |

## Other Accessories

Refer to Price List

Note: Specifications subject to change without notice. All product and company names are trademarks of their respective corporations.

REV:040426

302 Enzo Drive
San Jose, CA 95138 USA
ph 1 408 363 8000
fax 1 408 363 8313
info@sunrisetelecom.com

www.sunrisetelecom.com