SunSet™ SDH

SDH SPECIFICATIONS

622M/155M Optical

Transmitter

Bit rates
- 622.080 Mbit/s ± 5 ppm
- 155.520 Mbit/s ± 5 ppm

Frequency offset
- 622.080 Mbit/s ± 50 ppm 1, 10, 100 ppm steps
- 155.520 Mbit/s ± 150 ppm in 1, 10, 100 ppm steps

Wavelength
- Single
  - 1310 nm Intermediate Reach
  - 1310 nm Long Reach
  - 1550 nm Long Reach
  - Power Output
    - Intermediate Reach: -8 to -15 dBm
    - Long Reach: -5 to 0 dBm (155M); -3 to +2 dBm (622M)
  - Connector
    - FCUPC (SM-F) Standard
    - SCUPC (SM-F) Optional
- Dual
  - 1310 nm Intermediate Reach, 1550 nm Long Reach
  - 1310 nm Long Reach, 1550 nm Long Reach
  - Power Output
    - Intermediate Reach: -8 to -15 dBm
    - Long Reach: -3 to +2 dBm
  - Connector: LCUPC (SM-F)

Line Coding: NRZ

Payloads: VC4-4c Bulk, VC4 Bulk, 139M, 45M, 34M, 2M Async, 1.5M Async

Laser Safety: IEC825-1, Class 1, 21 CFR 1040.10 & 1040.11

Receiver

Wavelength: 1100-1600 nm

Input Sensitivity
- Intermediate Reach: -31 dBm typical
- Long Reach: - 36 dBm typical

Max Input Power: 0 dBm typical

Connector
- Single Wavelength
  - FCUPC (SM-F) Standard
  - SCUPC (SM-F) Optional
- Dual Wavelength: LCUPC (SM-F)

155M Electrical (STM-1)

Transmitter

Clock source
- Internal
  Bit Rates: 155.520 Mbit/s ± 5 ppm
- Frequency offset: 155.520 Mbit/s ± 150 ppm in 1, 10, 100 ppm steps
- Loop: Clock recovered from received signal
  Bit Rates: 155.520 Mbit/s
- 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)
- 75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (f)

Framing: Conforms to ITU-T G.707

Mapping: Conforms to ITU-T G.707

Payloads: VC4 Bulk, 139M, 45M, 34M, 2M Async, 1.5M Async

Receiver

Frequency recovery range: 155.520 Mbit/s ± 150 ppm

Jitter tolerance to ITU-T G.825

Impedances
- Terminate: 75Ω, unbalanced

Port/Connector
- 75Ω, unbalanced BNC (f)
- 75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (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: Clock recovered from received signal
  Bit rate: 51.840 Mbit/s

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: 45M, 2M Async, 1.5M Async

SunSet™ SDH

Port/Connector
    75Ω, unbalanced BNC (f)
    75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (f)

Receiver
Frequency recovery range: 51.840 Mbit/s ± 150 ppm
Input sensitivity
    Monitor: +3 to -26 dB resistive loss
Impedances: 75Ω, unbalanced (f)
Port/Connector
    75Ω, unbalanced BNC (f)
    75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (f)

Test Pattern Generator
2e23, 2e20, 2e15, 2e11, All 0s, All 1s, Alt 1010, QRS, 1-8, 1-16, 3-24
10 user patterns defined up to 32 bits.
Test pattern inversion

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 2×10^{-3}
        to 1×10^{-9}
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-PLM, LP-PLM,
    LP-RFI, LP-RDI

SDH Measurements (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
Performance: ITU-T G.821, G.826, M.2100/M.2101 (Maintenance or BIS)
Optical power level measurement
Optical reception saturation indication
Frequency measurements: 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

SDH Features
ITU-T and ETSI mapping
Overhead Monitoring
Programming K1, K2 APS signalling bytes per ITU-T G.783
Trace Generation
    J0 Section Trace/Generation: 16 bytes E.164 ASCII sequence + CRC-7
    J1/J2 Path Trace/Generation: 16 bytes E.164 ASCII sequence +
        CRC-7 or 64 bytes E.164 ASCII sequence
    THRU 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
DCC BER Testing through D1 to D3, D4 to D12 bytes
Orderwire: Talk/listen through E1, E2 bytes
Path Overhead Monitoring

Programmable POH bytes
    C2 signal label byte
    K3, K4 bytes (bits 1-4) for APS signalling
    V5 byte: Signal label generation (bits 5 to 7)
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 Mux/Demux Testing
Using two sets of physical ports: 2 Tx/2 Rx
The following combinations are applicable:
- 622M 0/45M
- 622M 0/34M
- 622M 0/2M
- 622M 0/1.5M
- 155M E (O)/45M
- 155M E (O)/34M
- 155M E (O)/2M
- 155M E (O)/1.5M

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

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

APS Timing Measurement (SWSDH-126)
Measures time that anomaly is present
Anomaly selection: MS-AIS, B2 errors
Selectable switch time to display PASS or FAIL
Selectable gate time to control the minimum interval for the circuit
    to be anomaly time

Propagation Delay Measurement
Round trip signal transmission delay
Measures in ns and UI (Unit Intervals)

PDH SPECIFICATIONS

139M (SWSDH-112)
Transmitter
Clock Source
- Internal
    Bit rate: 139.264 Mbit/s ± 5 ppm
- Frequency offset: 139.264 Mbit/s ± 150 ppm in 1, 10, 100 ppm steps
- Loop: Clock recovered from received signal
Pulse shape: Conforms to ITU-T G.703

Line Coding: CMI
Port/Connector
    75Ω, unbalanced (f)
    75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (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 2×10^{-3} to 1×10^{-9}
Alarm generation: AIS, FAS RAI

Receiver
Frequency recovery range: 139.264 Mbit/s $\pm$ 150 ppm
Jitter tolerance: Conforms to ITU-T G.823
Impedances
    Terminate: 75Ω, unbalanced
Port/Connector
    75Ω, unbalanced BNC (f)
    75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (f)

45M (SWSDH-111)
Transmitter
Clock Source
- Internal
  Bit rate: 44.736 Mbit/s, $\pm$ 5 ppm
- Frequency offset: 44.736 Mbit/s $\pm$ 500 ppm in 1, 10, 100 ppm steps
- Loop: Clock recovered from received signal
Line Coding: B3ZS
Pulse shape: Conforms to ITU-T G.703
Port/Connector
    75Ω, unbalanced BNC (f)
    75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (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 2×10^{-3} to 1×10^{-9}
Alarm generation: AIS, Yellow, Idle

Receiver
Frequency recovery range: 44.736 Mbit/s $\pm$ 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)
    75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (f)

34M
Transmitter
Clock Source
- Internal
  Bit rate: 34.368 Mbit/s $\pm$ 5 ppm
- Frequency offset: 34.368 Mbit/s $\pm$ 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: Frame, Unframe, Structured per ITU-T G.742, G.751
Error injection
    Code, Bit, Bit+Code, FAS
    Programmable error burst 1 to 9999 count, or error rate 2×10^{-3} to 1×10^{-9}
Alarm generation: AIS, FAS RAI
Port/Connector
    75Ω, unbalanced BNC (f)
    75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (f)

Receiver
Frequency recovery range: 34.368 Mbit/s $\pm$ 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)
    75Ω (optional): Replace BNC (f) with 1.6/5.6 mm (f)

Dual 2M
Transmitters (Lines 1 and 2)
Clock Source
- Internal
  Bit rate: 2.048 Mbit/s $\pm$ 5 ppm
- Frequency offset: 2.048 Mbit/s $\pm$ 24400 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: Clock 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
    120Ω, balanced, Bantam (optional)
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 2×10^{-3} to 1×10^{-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

Receivers (Lines 1 and 2)
Frequency recovery range: 2.048 Mbit/s $\pm$ 24400 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: 75Ω, unbalanced
    Bridge: > 5000Ω

Port/Connector
  120Ω, balanced RJ45 (f)
  120Ω (optional): balanced, Bantam

1.5M (SWSDH-110)
Transmitters (Lines 1 and 2)
Clock Source
- Internal
  Bit rate: 1.544 Mbit/s ± 5 ppm
- Frequency offset: 1.544 Mbit/s ± 500 ppm in 1, 10, 100 ppm steps
- External clock input port
- Recovered from Line 2 input (1.544 Mbit/s)
- Loop: Clock recovered from received signal

Line Coding: AMI, B8ZS
Pulse shape: Conforms to ITU-T G.703
Port/Connector
  120Ω, balanced RJ45 (f)
  120Ω (optional): balanced, Bantam
Framing: Unframed, SF-D4, ESF, SLC-96*. Conforms to ANSI T1.102, 107, 107A, 403, and 404. Also Telcordia TR-TSY-000009 and TR-TSY-000191. *SLC is a registered trademark of AT&T.
Error injection
  BPV, Logic, Logic+BPV, CRC-6, Frame
  Programmable error burst 1 to 9999 count, or error rate 2×10^{-3} to 1×10^{-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

Receivers (Lines 1 and 2)
Frequency 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: > 5000Ω
Port/Connector
  100Ω, balanced RJ45 (f)
  100Ω (optional): balanced, Bantam

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-Carriers 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, and their 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 only)

PDH Mux/Demux Testing (SWSDH-113)
Using two sets of physical ports: 2 Tx/2 Rx
The following combinations are applicable:
- 139M/34M
- 139M/2M
- 45M/2M
- 45M/1.5M
- 34M/2M

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 ns 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
Signal to Noise ratio (S/N) measurement
Receiver filters
  2M: 3.1 kHz, Psophometric, 1010 Hz notch
  1.5M: 3 kHz flat, C-message, C-notch

COMMON TO SDH/PDH/T–CARRIERS

Measurement Criteria
Test results/events storage capability
Stores up to 20 test results or 800 error 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

Status and Alarm Indicators
Power and low battery LED indicators
Pattern Sync and Bit Error
139/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

GENERAL

Upgrades: SW options upgradeable via software in-field cartridge replacement
Display: Backlit 320 x 240 dot STN indoor/outdoor Color screen CFL Backlight
Printer: Report printing via serial port
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℃
    Storage temperature: –20 to 70℃
    Humidity: 5% to 90% noncondensing
Dimensions
    Size: 10.5 x 7 x 27 cm
    Weight: 1.36 kg

ORDERING INFORMATION

Test Set
SSSDHC-NU   SunSet SDH/PDH Color
            Configured with 2 Tx and 2 Rx for 2 Mbit/s, Dual RJ-45 connectors, 120Ω. 34 & 155 Mbit/s electrical, 75Ω BNC connectors, Standard Accessories[1], CE compliant. Includes 622M hardware for field software upgrade to STM-4.

Note 1:   Standard accessories include: Universal AC Charger (SS138D), Protective Cartridge (SW2504), 2-pin Euro-style Power Cord (SA145-EU), User's Manual (SSSDHC-101)

Electrical Connector Options
- Bantam   Replace 1.5/2M-L1 and L2 Tx and Rx RJ-45 with dual Bantam connectors, 120Ω
- 1.6/5.6   Replace 34/45/52M and 139/155M BNC with dual 1.6/5.6 mm connectors, 75Ω

Optical Configurations
SS155M-13IR	STM-1 1310 nm Intermediate Reach, FCUPC
SS622M-13IR	STM-1/4 1310 nm Intermediate Reach, FCUPC
SS155M-13LR	STM-1 1310 nm Long Reach, FCUPC
SS622M-13LR	STM-1/4 1310 nm Long Reach, FCUPC
SS155M-15LR	STM-1 1550 nm Long Reach, FCUPC
SS622M-15LR	STM-1/4 1550 nm Long Reach, FCUPC
SS155M-13I/15L[2]	STM-1 1310 nm Intermediate/1550 nm Long Reach, LCUPC
SS622M-13I/15L[2]	STM-1/4 1310 nm Intermediate/1550 nm Long Reach, LCUPC
SS155M-13L/15L[2]	STM-1 1310/1550 nm Long Reach, LCUPC
SS622M-13L/15L[2]	STM-1/4 1310/1550 nm Long Reach, LCUPC
Note 2:	Dual Optical Wavelength options are offered only with LC connectors.

Optical Connector Options
- SC   Replace FCUPC with SCUPC connectors

Software Options
SWSDH WIN-C	Windows Remote Control
SWSDH -101	Histogram Analysis
	Includes 16 Mbyte Permanent Memory Card
SWSDH-110	1.5 Mbit/s Testing
SWSDH-111	45 Mbit/s Testing
SWSDH-112	139 Mbit/s Testing
SWSDH-113	PDH Mux/Demux Testing
SWSDH-114	VF Testing
SWSDH-120	52 Mbit/s Testing
SWSDH-123	G.783 Pointer Test Sequences
SWSDH-126	APS Switching Timing

Electrical Accessories
SS101	Carrying Case
SS104D	Cigarette Lighter Adapter
	15.5V, 2.5A output. To be used with SunSets equipped with NiMH batteries only.
SS106	Cable, Single bantam (m) 120Ω to single bantam (m) 120Ω, 2 m
SS115D	Printer Cable DIN-8 to DB-9 (m) w/Full Handshaking. Included when Remote Control, Remote Storage or SS118B/C is ordered.
SS117	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 & 220 VAC charger

SS122B	Null Modem Adapter
	DB9 (f) to DB9 (f) w/Full Handshaking or Remote Storage
SS123A	SunSet Jacket
	Provides additional weather protection for SunSets (SS123B included)
SS123C	SunSet Jacket, Large
	Provides additional weather protection for SunSets. Only for use with SS143B (SS123B included)
SS143B	Rubber Holster
SS210	Conversion Cable, BNC (m) 75Ω to 3-pin banana CF (m) 120Ω, 2 m
SS211	Cable, BNC (m) 75Ω to BNC (m) 75Ω, 2 m
SS212	Conversion Cable, BNC (m) 75Ω to Bantam 120Ω, 2 m
SS217	Cable, 1.6/5.6 (m) 75Ω to 1.6/5.6 (m) 75Ω, 2 m
SS218	Conversion Cable, 1.6/5.6 mm (m) 75Ω to 3-pin banana CF (m) 120Ω, 2 m
SS220	Cable, BNC (m) 75Ω to 1.6/5.6 mm (m) 75Ω, 2 m
SS225	Conversion Cable, Bantam (m) to 3-pin CF (m), 2 m
SS227	Conversion Cable, BNC (m) 75Ω to two probe clips 120Ω, 2 m
SA331	Adapter, BNC (m) to 1.6/5.6 mm (f)
SS423	Cable RJ-48 (m) to RJ-48 (m), 2 m
SS434	Cable RJ-48 (m) 120Ω to two 3-pin Banana CF (m) 120Ω, 2 m
SS436	Cable RJ-48 (m) 120Ω to two BNC (m) 75Ω connectors
SSSDHC-CC	Certificate of calibration/compliance when specified at the time of order
SSSDHC-CCM	Certificate of calibration/compliance with measurement data when specified at the time of order

Optical Accessories

SA501	Optical Patch Cord, FCUPC to FCUPC, 2 m
SA502	Optical Patch Cord, FCUPC to SCUPC, 2 m
SA503	Optical Patch Cord, FCUPC to STUPC, 2 m
SA505	Optical Patch Cord, FCUPC-VFO (Radial), 3 m
SA506	Optical Patch Cord, FCUPC-EC (Radial), 3 m
SA507	Optical Patch Cord, LCUPC to LCUPC, 2 m
SA508	Optical Patch Cord, LCUPC to SCUPC, 2 m
SA509	Optical Patch Cord, LCUPC to FCUPC, 2 m
SA511	Optical Patch Cord, SCUPC to SCUPC, 2 m
SA512	Optical Patch Cord, SCUPC to STUPC, 2 m
SA521	Fixed Optical Attenuator, FCPC, -10 dB
SA531	Fixed Optical Attenuator, SCPC, -10 dB
SA541	Optical Splitter, FCPC, 90/10
SA545	Optical Splitter, FCPC, 50/50
SA551	Optical Splitter, SCPC, 90/10
SA555	Optical Splitter, SCPC, 50/50

Warranty

SSSDHC-W1	Standard 1 year
SSSDHC-W2	Standard 2 years
SSSDHC-W3	Standard 3 years
SSSDHC-W4	Standard 4 years

Replacement

SA904	SunSet SDH Training CD. *Available at no charge with purchase of SunSet SDH when specified at time of order.*
SW2504	Protective Cartridge
SSSDHC-101	SunSet SDH User's Manual
SS123B	Carabiner hook for SunSet Jacket
SS138D	SunSet AC Adapter, 100-240 VAC, 50/60 Hz input, output 15 VDC @ 2A. Only for use with SunSets equipped with NiMH Battery Pack
SS140	9-Cell NiMH Battery Pack
	10.8 VDC, 1.8 Ahr
SA145-NA	2-prong Power Cord
	For use in North America and Asia
SS145-EU	Power Cord
	2-pin Euro-style for SS138D and SS142
SA720	Permanent Memory card
	16 Mbyte additional storage space

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