

## E1 Module

SSMTT-27/SSMTT-27L

### SPECIFICATIONS

#### Connectivity

##### SSMTT-27 Dual E1

Line 1 Tx, Line 1 Rx, Line 2 Tx, Line 2 Rx  
 75 $\Omega$  unbalanced BNC (f) (SSMTT-27-BNC)  
 120 $\Omega$  balanced RJ-48 (f) (SSMTT-27-RJ)

##### SSMTT-27L Single E1

Line 1 Tx, Line 1 Rx, Reference Clock  
 75 $\Omega$  unbalanced BNC (f) (SSMTT-27L-BNC)  
 120 $\Omega$  balanced RJ-48 (f) (SSMTT-27L-RJ)  
 2.048 Mbit/s bidirectional E1 interfaces  
 Stereo headphones port  
 Connector: 3.5 mm jack  
 Impedance: 220 $\Omega$

#### Status/Alarm Indicators

16 dual-color LED indicators for Line 1 & Line 2  
 Current status & alarm history for: Signal, code error, frame, AIS, alarm, error  
 Pattern sync and bit error LED indicators  
 Audible alarm

#### Test Pattern Generator

General: All 1s, All 0s, Alt 1010, 1-in-4, 1-in-8, 3-in-24, FOX  
 PRBS: 2<sup>n</sup>-1, n= 6, 7, 9, 11, 15, 20, 23; QRS, 2<sup>20</sup>-1 ITU-T  
 Conforms to ITU-T O.151, O.152, O.153  
 Programmable: 10 user patterns, 24 bits long with user definable labels  
 Selectable test pattern inversion  
 Automatic pattern synchronization

#### Error/Alarm Injection

Code, frame and/or bit error; programmable burst of 1 to 9999 error manually, or continuous rate of  $2 \times 10^{-3}$  to  $1 \times 10^{-9}$   
 CRC-4, E-bit: Single error  
 Generate AIS, TS16-AIS (PCM-30), MFAS RAI (PCM-30), FAS RAI (PCM-30 & 31) alarms

#### E1 General

Bit error test rates: 2.048 Mbit/s, N (contiguous) and M (noncontiguous) x 64 kbit/s (N & M=1 to 31)  
 Automatic configuration, Automatic Pattern Sync  
 Line coding: HDB3, AMI  
 Framing: Unframed, PCM-30, PCM-31, with or without CRC-4, conforms to ITU-T G.704  
 Programmable send frame words: Manual/auto E-bits, MFAS word bit 5, bit 6 (MFAS RAI), bit 7, bit 8, MFAS ABCD, FAS RAI, display & print, send & receive FAS/NFAS and MFAS words, CAS ABCD bits, auto CRC-4 generation, freely settable Sa4, Sa5, Sa6, Sa7, Sa8, bits to 1 or 0 for 8 frames  
 Set idle channel code and ABCD bits (PCM-30)

#### E1 Transmitters

Clock source  
 Internal: 2.048 MHz ( $\pm 5$  ppm). L1 Tx frequency adjustable over  $\pm 50$  kHz ( $\pm 25$  kppm) with resolution 1 Hz (individually adjustable)  
 External: Through Line 1 Rx or Line 2 Rx, selectable AMI, HDB3, or Sinusoidal TTL clock (Line 2 only)



*The E1 Module is part of a family of Plug-In Modules for the SunSet MTT and SunSet xDSL test sets (Dual E1 Modules shown)*

Loop: Recovered through Line 1 Rx or Line 2 Rx signal, selectable AMI or HDB3

Pulse shape: 3.0 Vbp ( $\pm 10\%$ ) at 120 $\Omega$ , 2.37 Vbp ( $\pm 10\%$ ) at 75 $\Omega$ . Conforms to ITU-T G.703.

#### E1 Receivers

Frequency: 2.048 Mbit/s  $\pm 6000$  bit/s  
 Input sensitivity  
 Terminate, bridge: +6 to -43 dB with ALBO  
 Monitor: -15 to -30 dB resistive  
 Impedances  
 Terminate, monitor: Line 1 & 2, 75 $\Omega$  unbalanced 120 $\Omega$  balanced  
 Bridge: Impedance  
 Jitter tolerance conforms to ITU-T G.823

#### Measurements

Error Type: Code, bit, CRC-4, FE, E-bit errors, slips  
 Typical error type reports: Error count, error rate, ES, %ES, SES, %SES, UAS, %UAS, EFS, %EFS, AS, %AS  
 ITU-T G.821 Analysis, error type reports: Bit error & rate, ES, %ES, SES, %SES, EFS, %EFS, UAS, %UAS, AS, %AS, SLIP  
 ITU-T G.826 bidirectional analysis, CRC-4 block based; error type reports: EB, BBE, %BBE, ES, %ES, SES, %SES, UAS, %UAS, EFS, %EFS  
 ITU M.2100/550  
 Alarm statistics: LOS sec, LOF sec, AIS sec, FAS RAI sec, MFAS RAI sec  
 Frequency (Max hold, Min hold, Current), clock slips, wander  
 Signal level +7 to -36 dB  
 Print on event (Enable/Disable)  
 Print at timed interval (settable up to 999 hr, 59 min) or at end of test  
 Measurement duration continuous or timed; settable up to 999 hr, 59 min  
 Programmable measurement with selection of start TIME & DATE and measurement duration

#### Other Measurements

Pulse mask analysis  
 Scan period, 500 ns  
 On screen pulse shape display with G.703 pulse mask verification  
 - Displays pulse width, rise time & fall time in ns, %overshoot, %undershoot, signal level  
 - Pulse mask storage and printing

Histogram analysis (requires SA701 2<sup>nd</sup> memory card)  
 Graphical display of accumulated errors (Bit, Code, EBit, CRC, FAS) events and alarms (LOS, AIS, LOF, FAS RAI, MFAS RAI, LOPS) events  
 Stores & prints 30 days by hour and 24 hours by minute  
 Propagation delay: Measures propagation delay in microseconds & UIs (Unit Interval)  
 Maximum delay measurement (at 2.048 Mbit/s): 8 seconds  
 View received data  
 View live traffic 4096 bits long (16 full frames/one multiframe) in PCM-30/31  
 Displays 8 timeslots per screen  
 Stores 64 scrollable screens, hold screen, print  
 Information displayed in ASCII, reverse ASCII, Binary, HEX  
 View timeslot 16 (MFAS, NMFAS ABCD) in PCM-30: 16 frames  
 View timeslot 0 (FAS, NFAS, CRC, MFAS/CRC words, E-bits Sa4 to Sa8, A-bit) in PCM-30 & 31: 16 frames  
 Save test results of measurement runs, error & alarm events  
 Save up to 50 test results  
 Saved record can be locked  
 Save at timed interval (selectable over 1 to 9999 minutes)

## E1 Voice Frequency

Companding: A-Law  
 View channel data 1 byte long (binary format)  
 Built-in microphone for talk  
 Monitor speaker or optional headphones (SS149) with volume control  
 Signal to noise ratio measurement  
 Noise measurements with 3.1 kHz flat, psophometric weighting, 1010 Hz notch  
 Tone generation: 50 to 3950 Hz, resolution 1 Hz; +3 to -60 dBmO, resolution 1 dB  
 Level and frequency measurement: 50 to 3950 Hz +3 to -60 dBmO  
 Coder offset and peak code measurements  
 ABCD bits monitor & transmit in selected channel (PCM-30)  
 Simultaneously view 30 channels in ABCD bits (PCM-30) or Programmable ABCD states for IDLE, SEIZE, SEIZE ACK, ANSWER, CLEAR BACK, CLEAR FORWARD, BLOCK ABCD (for SSMITT-27 only)

## Jitter Measurement (SWMITT-27JM)

Instrument specs: Per ITU-T 0.171 and 0.172 (2M payloads)  
 Measurement range: Per ITU-T G.823  
 Wide band Jitter measurement (w/20 Hz to 100 kHz filter)  
 High band Jitter measurement (w/18 kHz to 100 kHz filter)  
 PASS/FAIL threshold: Per ITU-T G.823 or User defined  
 Test Rate: 2.048 Mbit/s  
 Parameters: Current peak-peak, Maximum peak-peak, RMS, Maximum RMS, Current +peak and -peak, Maximum +peak and -peak, positive and negative phase hits  
 Units: UI (Unit Interval)  
 Resolution: 0.01 UI<sub>p-p</sub>  
 Accuracy: Per ITU-T 0.171 and 0.172  
 Connector: Rx, BNC 75Ω or RJ-48 120Ω  
 Test duration: Timed or Continuous  
 Storage: Up to 10,000 measurement intervals; 10 records with the 2<sup>nd</sup> memory card  
 Measurement interval: 1 second  
 Jitter histogram (requires 2<sup>nd</sup> memory card)

## Jitter Generation (SWMITT-27JG)

Modulation source type: Sinusoidal  
 Jitter amplitude/frequency: Per ITU-T 0.171

## Jitter Tolerance Measurement

Requires Jitter Generation option  
 PASS/FAIL template: Per ITU-T G.823 (from 10 Hz to 100 kHz)  
 Test frequencies: Up to 20 points  
 Technique: Onset of Errors  
 Storage: 10 records with the 2nd memory card

## Jitter Transfer Measurement

Requires both Jitter Measurement & Generation options  
 PASS/FAIL template: Per ITU-T G.735, G.736, and G.737 (from 10 Hz to 100 kHz)  
 Test frequencies: Up to 20 points  
 Storage: 10 records with the 2nd memory card

## Wander Measurement (SWMITT-27WM)

(Preliminary Specifications)  
 Instrument specs: Fully compliant to ITU-T 0.171 and 0.172 (payloads inside SDH signals)  
 Test interface: 2.048 Mbit/s  
 Reference clock: 2.048 MHz, 2.048 Mbit/s (L2-Rx)  
 Real Time Measurements  
 Time Interval Error (TIE) per 0.171  
 - Amplitude (ns)  
 Off-line measurements  
 Maximum Time Interval Error (MTIE)  
 Time Deviation (TDEV)  
 Graphic display of results conforming to G.810, G.811, G.812, G.813, and G.823 MTIE/TDEV masks  
 TIE data transfer from test set to PC via MMC card

## General

Module size: 5.0" (W) x 3.5" (L) x 0.9" (H) [12.6 x 9 x 2.2 cm]  
 Operating temperature: 32°F to 122°F [0°C to 50°C]  
 Storage temperature: -4°F to 158°F [-20°C to 70°C]  
 Humidity: 5% to 85% noncondensing

## ORDERING INFORMATION

SSMITT-27	Dual E1 Module
SSMITT-27L	Single E1 Module
SSMITT-27-BNC	BNC connector option for SSMITT-27
SSMITT-27L-BNC	BNC connector option for SSMITT-27L
SSMITT-27-RJ	RJ-48 connector option for SSMITT-27
SSMITT-27L-RJ	RJ-48 connector option for SSMITT-27L
SWMITT-27JM	Jitter Measurement option
SWMITT-27JG	Jitter Generation option
SWMITT-27WM	Wander Measurement option
	Requires hardware with Wander ready.

## Recommended Cables

SS211	Cable, BNC (m) to BNC (m)
SS434	Cable, RJ-48 (m) to two 3-pin banana (m)

## Other

SS149	Headphones
SA701	1MB SRAM Card

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