E1 Module
SSMTT-27/SSMTT-27L

SPECIFICATIONS

Connectivity

SSMTT-27 Dual E1
Line 1 Tx, Line 1 Rx, Line 2 Tx, Line 2 Rx
  75Ω unbalanced BNC (f) (SSMTT-27-BNC)
  120Ω balanced RJ-48 (f) (SSMTT-27-RJ)

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

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^n-1, n= 6, 7, 9, 11, 15, 20, 23; QRS, 2^{20}-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 2×10^{-3} to
  1×10^{-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 ad-
    justable 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 sig-
    nal, selectable AMI or HDB3
Pulse shape: 3.0 Vbp ($\pm$ 10%) at 120Ω , 2.37 Vbp ($\pm$
  10%) at 75Ω. 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, 75Ω unbalanced
    120Ω 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; er-
  ror 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 2nd 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 dBm0, resolution 1 dB
Level and frequency measurement: 50 to 3950 Hz +3 to -60 dBm0
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 SSMTT-27 only)

Jitter Measurement (SWMTT-27JM)
Instrument specs: Per ITU-T O.171 and O.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_{p-p}
Accuracy: Per ITU-T O.171 and O.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 2nd memory card
Measurement interval: 1 second
Jitter histogram (requires 2nd memory card)

Jitter Generation (SWMTT-27JG)
Modulation source type: Sinusoidal
Jitter amplitude/frequency: Per ITU-T O.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 (SWMTT-27WM)
(Preliminary Specifications)
Instrument specs: Fully compliant to ITU-T O.171 and O.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 O.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

SSMTT-27	Dual E1 Module
SSMTT-27L	Single E1 Module
SSMTT-27-BNC	BNC connector option for SSMTT-27
SSMTT-27L-BNC	BNC connector option for SSMTT-27L
SSMTT-27-RJ	RJ-48 connector option for SSMTT-27
SSMTT-27L-RJ	RJ-48 connector option for SSMTT-27L
SWMTT-27JM	Jitter Measurement option
SWMTT-27JG	Jitter Generation option
SWMTT-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