E1/T1 Analyzer and BER Tester

BTM10

The BTM10 E1/T1 analyzer is a compact, sub-note sized E1/T1 PCM measuring instrument designed for field use in analysis and maintenance of data communications (V.35, RS-530/449/232/422 and X.21), E1 (2.048Mbps) or T1 (1.544Mbps) lines. The BTM10 performs framed, unframed, signaling analysis, drop and insert 8K voice, Nx64Kbps, or Nx56Kbps data into any time slot. The BTM10 analyzer also provides a variety of E1 or T1 line statuses, transmission performance testing (BERT) and monitoring. On the E1 or T1 line, the BTM10 may be used as a generator or receiver.

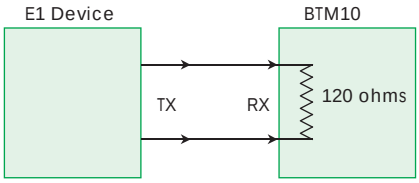
Features

- E1 BERT Analysis: E1/T1frame, code, CRC, and BPV performance analysis and generator.
- Alarm Setting: Manual or automatic alarm setting.
- VF Access: Drop and Insert 8K voice; frequency generator (transmit VF Frequency from 60 to 3950 Hz, transmit VF level from 0dBm to -55dBm) and measurement (A-law and u-law). Voice access by using telephone handset. E1/T1 pulse shape analysis. E1/T1 PCM level meter and frequency analysis.
- Pulse Shape: E1/T1 pulse shape analysis
- Signal Result: E1/T1 PCM level meter and frequency analysis
- Signaling Setting: ABCD bit setting
- Signaling Display: Display all channel's of ABCD bits
- BERT on Data port: Data port BERT performance analysis
- Remote control: Remote controlled by PC terminal or modem
- SS7 analysis: Decode and performance analysis of levels 2, 3, 4
- V5.1/V5.2 Analysis: Monitoring V5 Signaling information
- ISDN Analysis: Digital Subscriber Signaling System No.1 (DSS 1)-Monitoring ISDN D-Channel Signaling information (ITU Q.921,Q.931)
- Example Analysis: off-line analysis of BERT performance
- External Drop and insert: Acts as a fractional E1 or T1 converter
- User Programmable pattern setting: There are three 32 bit programmable patterns, which can be inserted onto the E1/T1 line and drop for analysis available, by passed, or idle
- Timeslot setting: Timeslot, Drop and Insert Nx64k data onto E1/T1 line
- Timeslot mapping data: Analyze any channel data of two frames
- Slip measure: Uncontrolled, Controlled, Frame, and Timing SLIP measure
- Sa bits setup and monitor: Multi-frame Sa bits setup and monitor.(E1 only)
- File management: Ten configuration and result memory locations can be stored and recall by user
- Datacom clock measurement
- Round trip delay measurement

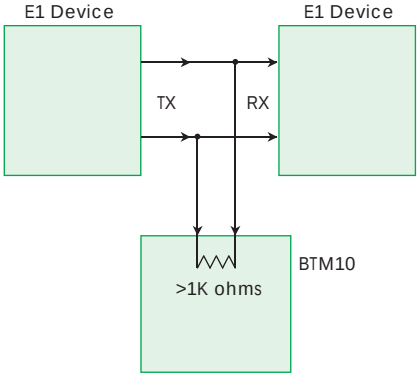
Specifications

General	• 1 port E1 (BNC unbalanced and DB15 balanced), T1 (DB15 balanced) ITU G.703(E1), ANSI T1.403(T1) & ITU G.703(T1) • 1 port data communications s/w selectable V.35, RS530, X.21, RS-232 • 1 port RS-232 console, remote • 1 port parallel printer port Print out via parallel Port • LCD display 32 Characters x 8 Lines, Text / Graphic mode
Indications	LEDs (TD, RD, RTS, CTS, DSR, DTR, DCD, TC, RC, XTC, DTE, DCE, Sync loss)
Power Input	AC100~240V adapter to DC 12V 1A
Dimensions	137 x 235 x 54mm (W x D x H)
Weight	1.6 Kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	35,000 hrs

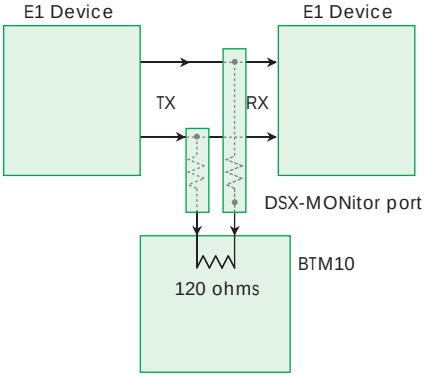
Receiver in Terminal Mode



Receiver in Bridge Mode



Receiver in Monitor Mode



E1 Specification

1. Receiver Interface of E1/CEPT

- Line Code: HDB3/AMI
- Pulse characteristics: meets ITU G.703
- Jitter Tolerance: meets ITU G.823
- Input Port Type: Coaxial pair Symmetrical pair DB15 (balanced)
- Input mode (with AGC):

  Termination: Coaxial Pair Impedance:75ohm resistive (unbalanced)
  Symmetrical Pair Impedance:120ohm resistive (balanced)
  Return Loss: >18dB
  Receive Sensitivity:+3dB to -40dB

  Bridge Mode: Impedance: >1000ohm Receive Sensitivity: +3dB to -30dB

  DSX-Monitor Mode: Coaxial Pair Impedance 75ohm resistive(unbalanced)
  Symmetrical Pair Impedance:120 ohm resistive (balanced)
  Receive Sensitivity: +6dBdsx to -30dBdsx

  Receive Timing Range: 2.048MHz±4000Hz

2. Transmitter Interface of E1/CEPT

- Bit Rate:2048K bit/s+/-3ppm
- Line Code:HDB3/AMI
- Pulse characteristics: Meets ITU G.703
- Pulse Amplitude: Nominal 2.37V for Coaxial Pair 75 ohm
  Nominal 3.00V for Symmetrical Pair 120 ohm
- Zero Amplitude:+0.1 V max.
- Jitter Tolerance: Meets ITU G.823
- Output Port Type: Coaxial pair: BNC (unbalanced)
  Symmetrical pair: Bantam or DB15 (balanced)
- TX Clock Source:

  1.Internal Timing: 2.048MHz+/-3ppm.
  2.Internal Timing plus 50ppm offset(30ppm factory option)
  3.Internal Timing minus 50ppm offset(30ppm factory option)
  4.Recovery from RX Timing (Loop Timing)
  5.External Timing
  6.Data Port Timing

3. E1/CEPT Frame Structure

Unframed / FAS (PCM31) / FAS+CRC4 (PCM31 with CRC)
FAS+CAS (PCM30) / FAS+CRC4+CAS (PCM30 with CRC)

4. Line Build Out

0dB / -7.5dB / -15dB / -22.5dB (Accuracy: +/-1dB)

5. E1/T1 Analyzer Mode

1. Channel Map
2. Line Attenuation
3. Slip Measure
4. Signaling
5. General Status: Signal Present / HDB3 / Pattern Sync /
   Frame Sync / Looping
6. Results: Bit Errors / BPV Errors / Frame Errors / CRC Errors /
   G.821 Analysis / G.826 Analysis
7. Alarm/Warning: Signal Loss(Pulses) / Frame Loss / Pattern Loss /
   Excess Zero Error / One Density / AIS / SLIP / RAI / MRAI
8. Print out of test results.

T1 Specification

1. Receiver Interface of T1/DS1

- Line Code: B8ZS/AMI
- Pulse characteristics: meets ITU G.703
- Jitter Tolerance: meets ITU G.824
- Input Port Type: Symmetrical pair: Bantam or DB15 (balanced),
  and BNC Symmetrical pair
- Input mode (with AGC):

  Termination: Symmetrical Pair Impedance: 100ohm resistive +/-
  5% resistive(unbalanced)
  Return Loss: >18dB
  Receive Sensitivity:+6dB to -36dB

  Bridge Mode: Impedance: >1000ohm
  Receive Sensitivity: +6dB to -36dB

  DSX-Monitor Mode: Symmetrical Pair Impedance:
  100ohm resistive +/- 5% resistive(unbalanced)
  Receive Sensitivity: up to -30dBdsx

  Receive Timing Range: 1.544MHz +/- 4000Hz

2. Transmitter Interface of T1/DS1

- Bit Rate: 1544K bit/s+/-3ppm
- Line Code: B8ZS/AMI
- Pulse characteristics: Meets ITU G.703
- Pulse Amplitude: Nominal 3.00V for Symmetrical Pair 100 ohm
- Zero Amplitude: +0.1 V max.
- Jitter Tolerance: Meets ITU G.824
- Output Port Type: Symmetrical pair: Bantam or DB15 (balanced)
- TX Clock Source:
  1. Internal Timing: 1.544MHz +/-3ppm
  2. Internal Timing plus 50ppm offset (30ppm factory option)
  3. Internal Timing minus 50ppm offset (30ppm factory option)
  4. Recovery from RX Timing (Loop Timing)
  5. External Timing
  6. Data Port Timing

3. T1/DS1 Frame Structure

ESF / ESF+CRC6 / D4(SF) / SLC-96 / T1DM / Unframed

4. Line Build Out:

0dB , -7.5dB , -15dB , -22.5dB (Accuracy: +/-1dB)

Specifications for G.703 E1/T1 BERT

1. BERT Patterns

- 63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard,
- 215-1 non- standard (inverted), 220-1 ITU standard,
- 220 -1 non-standard (inverted), QRSS, 223 -1 ITU standard,
- 223-1 non-standard (inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable

2.BERT Display Format

- Normal ITU-M.2100 (option) / ITU G.821 / ITU G.826

3. BERT Transmit Error Rate

- Force Single Error: Logic (Bit), Frame, CRC, and BPV (Bipolar Violation)
- Force 10-3 to 10-7 Error Rate: Logic (Bit), Frame, CRC, and BPV

4. Performance Analysis

- Logic, Frame, CRC, BPV, E-bit Errors
- Receive Counter
- Error Seconds
- Error Free Seconds
- Error Rate
- G.821 Available Seconds
- G.821 Degraded Minutes
- G.821 Severely Error Seconds
- G.821 Error Seconds
- G.821 Unavailable Seconds
- G.826 Blocks
- G.826 Available Seconds
- G.826 errored block (EB)
- G.826 background block error (BBE)
- G.826 errored second (ES)
- G.826 severely errored second (SES)
- G.826 errored second ratio (ESR)
- G.826 severely errored second ratio (SESR)
- G.826 background block error ratio (BBER)
- LOF (Loss of Frame) Events
- COFA (Change of Frame Alignment) Events
- Severely Errored Frame Count.

Specifications for Datacom BERT

Mode A: DTE or DCE Synchronous BERT

- Interface
  RS-232, V.35, X.21, RS-449, RS-530
- Data rates for 56Kbps Multiples; Nx56Kbps (n=1~24)
  56k, 112k, 168k, 224k, 280k, 336k, 392k, 448k, 504k, 560k, 616k, 672k, 728k, 784k, 840k, 896k, 952k, 1008k, 1064k, 1120k, 1176k, 1232k,1288k, 1344k, 1400k, 1456k, 1512k, 1568k,1624k, 1680k, 1736k, and 1792k bps.
- Data rates for 64Kbps Multiples; Nx64Kbps (n=1~32)
  64k, 128k, 192k, 256k, 320k, 384k, 448k, 512k, 576k, 640k, 704k, 768k, 832k, 896k, 960k, 1024k, 1088k, 1152k, 1216k, 1280k, 1344k,1408k, 1472k, 1536k, 1544k, 1600k, 1664k, 1728k, 1792k, 1856k, 1920k, 1984k, and 2048k bps.
- BERT Patterns:
  63, 127, 29-1 (511), 211-1 (2047), 215-1 ITU standard, 215-1 non- standard(inverted), 220-1 ITU standard, 220 -1 non-standard(inverted), QRSS, 223 -1 ITU standard, 223-1 non-standard(inverted), ALL ONEs (Mark), ALL ZEROs (Space), ALT (0101..), 3 in 24, 1 in 16, 1 in 8, 1 in 4, User Programmable
- Tx Clock Source:
  The Tx Clock may be set to internal or external. The polarity may also be inverted.
- Rx Clock Source:
  The Rx Clock is set to external. The polarity of the external clock may also be inverted.
- BERT Transmit Error Rate:
  single, 10e-3, 10e-4, 10e-5, 10e-6, or 10e-7.
- Flow Control:
  DCE permitted to transmit on RTS signal or not,

Mode B: DTE or DCE Synchronous BERT

1. Data Rate

- Asynchronous: from 50 to 115.2K bps.
- Synchronous: from 150 to 72K bps.

2. BERT Patterns

- 63, 511, 2047, FOX, SPACE, MARK, and ALT

3. Tx Clock Source

- DTE or DCE

4. Flow Control

- Xon/Xoff, RTS/CTS, or disable

Ordering Information

Model Name	Description
BTM10-E1	E1 analyzer (Full function ; with pulse shape/datacom function)

Optional Function

Datacom Feature	Datacom BERT External drop/insert
Pulse shape Feature	Pluse shape Analysis Singal result level measurement
BTM10-SS # 7	Decode or Level 2,3 and 4 Performance Measurement
BTM10-ISDN	ITU Q.921, Q.931 recommendation
BTM10-V5 (V5.1, V5.2)	ITU G.964, G.965 recommendation
BTM10-M.2100	ITU M.2100 recommendation