ALBEDO Telecom

in Test we Trust

The AT-2048 is the ultimate E1 tester designed for field engineers that are installing, commissioning and troubleshooting E1 links, Synchonization Networks, and Datacom circuits. You will enjoy top performance, high accuracy and a good price.

Datasheet

ALBEDO AT-2048

ALBEDO Telecom is delighted to present the AT.2048, the ultimate and world's most comprehensive BER analyzer / generator for E1, Datacom, Jitter, Wander, Pulse mask, Frame Relay, VF, and more. The AT.2048 is truly rugged and is ideal for field engineers installing and maintaining E1 and Datacom circuits. Designed with the latest technology in 2011 is light, fast, friendly and comprehensive. Believe or not, it is the envy of our American and Chinese competitors that dream to have one day a similar unit. Ideal for field engineers installing, commissioning and troubleshooting E1 links, ISDN, Voice Services, Synchronization Networks, and Datacom circuits.

1. ITU-T G.703 / E1 Interface

1.1 Connectors

- Port A: Unbalanced (BNC) 75 Ω and balanced (RJ-45) 120 Ω)
- Port B: Balanced (RJ-45) 120 Ω
- Port C: Unbalanced (BNC) 75 Ω and balanced (RJ-45) 120 Ω
- Analogue voice frequency audio portLine
- Connection modes: E1 monitor, E1 endpoint, E1 mux, E1 demux, E1 through, G.703 / E0 endpoint, analogue
- Bidirectional testing (E1 monitor, E1 endpoint, E1 through) by simultaneous operation of Port A and Port B)
- Configurable input impedance: nominal line impedance, PMP 20 dB, PMP 25 dB, PMP 30 dB, high impedance (> 1000 Ω)
- Configurable output frequency offset within ±25,000 ppm around the nominal frequency
- Line codes: HDB3, AMI
- Input Level: From 0 dB to -45 dB
- Pulse mask compliance: ITU-T G.703
- Jitter compliance: ITU-T G.823

1.2 Frame

- 2048 kb/s unframed, ITU-T G.704, ITU-T G.704 CRC, ITU-T G.704 CAS, ITU-T G.704 CRC + CAS
- Generation of custom NFAS spare bits (ITU-T G.704 frame with CRC-4 multiframe)
- CAS A, B, C, D bit generation for each voice channel. Generation of CAS multiframe spare bits (ITU-T G.704 frame with CAS multiframe)

1.3 Test Patterns and Signals

- PRBS 9 (ITU-T O.150, 0.153), PRBS 11 (ITU-T O.150, 0.152, 0.153), PRBS 15 (ITU-T O.150, 0.151), PRBS 20 (ITU-T O.150, 0.153), PRBS 23 (ITU-T O.150, 0.151), PRBS 9 inverted, PRBS 11 inverted, PRBS 15 inverted, PRBS 20 inverted, PRBS 23 inverted, all 0, all 1
- User configurable 32 bit word
- Tone (from 10 Hz to 4000 Hz, from +6 dBm to -60 dBm)
- External signal: Analogue, 64 kb/s G.703 / E0 , datacom interface

1.4 Analysis

Analogue

- Line attenuation (dB), frequency (Hz), frequency deviation (ppm), round trip delay (µs)
- Analogue results include pass / fail indications

Defects

- LOS, LOF, AIS, RAI, CRC-LOM, CAS-LOM, MAIS, MRAI, LSS, All 0, All 1.

Anomalies

- Code, FAS error, CRC error, REBE, MFAS error, TSE, Slip
- Live and history LEDs for all Defects and Anomalies

Performance

- ITU-T G.821 performance: ES, SES, UAS, DM. ITU-T G.821 results include pass / fail indications
- ITU-T G.826 performance: ES, SES, UAS, BBE (near and far end statistics). ITU-T G.826 results include pass / fail indications
- ITU-T M.2100 performance: ES, SES, UAS, BBE (near and far end statistics). ITU-T M.2100 results include pass / fail indications
- ITU-T G.711 occupation map and time slot analysis: maximum code, minimum code, average code, time slot level and frequency
- CAS A, B, C, D bit analysis

1.5 Drop to external output

- Analogue
- 64 kb/s codirectional (Port A only)
- Data communications interface

1.6 Event Insertion

- Physical: AIS, LOS
- Frame: FAS error, CRC error, MFAS error, REBE, LOF, MAIS, CAS-LOM, RAI, MRAI, CRC-LOM
- Pattern: TSE, Slip, LSS, All 0, All 1

Insertion modes

- Single (anomalies)
- Rate (anomalies)
- Continuous (defects)
- Burst of M (defects), M out of N (defects)

2. Pulse Mask Analysis

- Pass / fail indication for compliance with ITU-T G.703 E1 mask.

Operation modes

- Eye diagram
- Continuous run

Measurement

- Pulse width
- Rise time
- Fall time level
- Overshoot and Undershoot (positive and negative pulses)

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3. Jitter and Wander

3.1 Generation Function

- Modulation waveform: sinusoidal
- Modulation frequency range: 1 µHz to 100 kHz
- Modulation frequency resolution: 0.1 Hz (jitter), 1 µHz (wander)
- Modulation amplitude: 0 – 1000 Uipp
  (Max. depends on modulation frequency)
- Modulation amplitude resolution: 1 mUIpp or $1/10^4$ configured value
- Modulation amplitude accuracy: better than 0.172
- Smooth amplitude changes in jitter range (10 Hz – 100 kHz)
- Intrinsic jitter < 10 mUIpp
- Jitter Analysis Function
- Closed loop phase measurement method. Ref. frequency not required
- Modulation frequency range: 0.1 Hz to 100 kHz (locking time 10 s), 1 Hz to 100 kHz (locking time 1 s), 10 Hz to 100 kHz (locking time < 1 s)
- Modulation amplitude: 0 to 1000 UIpp (single range) (maximum amplitude depends on modulation frequency)
- Modulation amplitude resolution: 1 mUIpp
- Measurement accuracy: better than ITU-T O.172
- Jitter measurement results: peak to peak jitter, RMS jitter, maximum jitter (user reseteable), hits detection & count (user selectable threshold)
- Jitter measurement observation time: 1 s, 10 s, 60 s

Measurement selectable filters

- LP (f < 100 kHz)
- LP+HP1 (20 Hz < f < 100 kHz)
- LP+HP2 (18 kHz < f < 100 kHz)
- LP+RMS (12 kHz < f < 100 kHz)

3.2 Wander Analysis Function

Built-in real time features

- Open loop measurement method. Reference frequency required
- Modulation frequency range: 1 µHz to 10 Hz
- Wander sampling frequency: 50 Hz
- Modulation amplitude: 0 to ±2 s (single range)
- Modulation amplitude accuracy: 2 ns
- Instantaneous: TIE, frequency offset, frequency drift
- Statistics results: TIE, MTIE, TDEV
- Statistics range: 10^2, 10^3, 10^4, 10^5, 10^6 s
- Built in, real time statistics analysis.

4. ITU-T G.703 / E0 Interface

- The ITU-T G.703 / E0 interface is available only for the AT-2048

4.1 Connector

- Balanced (RJ-45) 120 Ω
- Clock interface for ITU-T G.703 contradirectional and centralized interfaces is provided through external adapter.

4.2 Features

- Bit rate N x 64 kb/s (N from 1 to 4)
- Test pattern generation and analysis over co-directional interfaces
- Defect insertion and analysis: LOS, AIS, LSS, All 0, All 1
- Anomaly insertion and analysis: TSE, Slip

5. Data Communications

5.1 Connectors

- Smart Serial datacom connector for the DTE and DCE (all interfaces) (CISCO standard)

5.2 Interfaces

- V.24/V.28 asynchronous (RS-232) from 50 b/s to 128 kb/s
- V.24/V.28 synchronous (RS-232) from 50 b/s to 128 kb/s
- X.21/V.11 from 50 b/s to 2048 kb/s
- V.35 from 50 b/s to 2048 kb/s
- V.36 (RS-449) from 50 b/s to 2048 kb/s
- EIA-530 from 50 b/s to 2048 kb/s
- EIA-530A from 50 b/s to 2048 kb/s

5.3 Tests

- Operation: DTE emulation, DCE emulation and full duplex monitor
- Test pattern generation and analysis over a datacom interfaces
- Logic analyser capability
- Defects: LOC, AIS, LSS, All 0, All 1
- Anomalies: TSE, Slip
- Analogue: Line attenuation (dB), frequency (Hz), freq. deviation (ppm)

6. Frame Relay Monitoring

6.1 Interfaces

- X.21/V.11 from 50 b/s to 2048 kb/s
- V.35 from 50 b/s to 2048 kb/s
- V.36 (RS-449) from 50 b/s to 2048 kb/s
- EIA-530 / EIA-530A from 50 b/s to 2048 kb/s

6.2 Settings

- DLCI

6.3 Events

- Long frames, short frames
- Alignment errors
- FCS errors
- Frame abort count

6.4 Statistics

- Bandwidth statistics
- Maximum and minimum frame size
- Frames with FECN, BECN and DE
- Active DLCI list
- LMI frame count

6.5 Analogue Test

- Tone Generation (from 10 Hz to 4000 Hz, from 0 dBm to -60 dBm)
- Level and frequency
- ITU-T G.711 analysis: maximum code, minimum code, average code

7. Synchronization

- Internal clock reference
- Recovered clock
- External reference clock: 2,048 kb/s (ITU-T G.703), 2,048 kHz
- Configurable input gain: 0 dB, -20 dB

8. Platform

8.1 Ergonomics

- Size 223 x 144 x 65 mm
- Weight: 1.0 kg (with rubber boot, one battery pack)
- 4.3 inch TFT colour screen (480 x 272 pixels)

8.2 Graphical User Interface

- GUI controlled by Touch-screen, Keyboard or Mouse
- Direct configuration and management in graphical mode
- User interface by touch-screen, keyboard and mouse
- Full remote control with VNC
- Configuration up/down through Internet, USB and SNMP
- Local management with CLI
- Full remote control: SNMP, SSH, VNC

8.3 Results

- Local storage in txt and pdf files
- File transfer to SD card and USB port
- File management through web interface and SNMP

8.4 Board

- 2 x USB ports
- 1 x RJ45 port
- 2 x LEDs
- Software upgrade through USB port

8.5 Batteries

- Li Ion Polymer
- Up to 24 hours of operation in E1 (with two packs)

8.6 Operational Ranges

- IP rating: 54
- Operational range: -10ºC to +50ºC
- Storage range: -20ºC to +70ºC
- Operation humidity: 5% - 95%

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