



ALBEDO AT.2048 is a rugged, extremely fast, and full-featured field tester designed in 2010 for E1 / Datacom mobile & fixed networks

Datasheet

AT-2048: E1+Data+Wander+FRL

CONFIDENTIAL

1. E1 GENERATION / ANALYSIS

1.1 Connectors

- Port A: Unbalanced (BNC) 75 Ω balanced (RJ-45) 120 Ω .
- Port B: Balanced (RJ-45) 120 Ω .
- Analogue voice frequency audio port

1.2 Line

- Connection modes: E1 monitor, E1 endpoint, E1 mux, E1 demux, E1 through, codirectional endpoint, analogue
- Bidirectional testing (E1 monitor, E1 endpoint, E1 through) by simultaneous operation of Port A and Port B
- Configurable input impedance: nominal line, PMP 20 dB, PMP 25 dB, PMP 30 dB, high impedance (> 1000 Ω).
- Configurable output frequency offset within $\pm 25,000$ 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

1.3 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

1.4 Test Patterns and Signals

- PRBS 9 (ITU-T O.150, O.153), PRBS 11 (ITU-T O.150, O.152, O.153), PRBS 15 (ITU-T O.150, O.151), PRBS 20 (ITU-T O.150, O.153), PRBS 23 (ITU-T O.150, O.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 (Port A only), 64 kb/s codirectional (port A only), data communications interface
- A, B, C, D bit generation for each time slot for emulation of signalling standards based on CAS like the MFC R2

1.5 Analysis

- Analogue: Line attenuation (dB), frequency (Hz), freq. deviation (ppm), round trip delay (μ s). PASS / FAIL indications

- Defects: LOS, LOF, AIS, RAI, CRC-LOM, CAS-LOM, MAIS, MRAI, LSS, All 0, All 1
- Anomalies: Code, FAS, CRC, REBE, MFAS, TSE, Slip
- Live and history LEDs for all Defects and Anomalies
- ITU-T G.821 performance: ES, SES, UAS, DM. ITU-T G.821. PASS / FAIL indications
- ITU-T G.826 performance: ES, SES, UAS, BBE (near / far end statistics). PASS / FAIL indications
- ITU-T M.2100 performance: ES, SES, UAS, BBE (near and far end statistics). PASS / FAIL indications
- ITU-T G.711 occupation map and time slot analysis: maxicode, min code, average code, time slot level and frequency
- A, B, C, D bit analysis for decoding of telephone signalling standards based on CAS like the MFC R2
- Drop to external output: Analogue, 64 kb/s codirectional (Port A only), data communications interface

1.6 Event Insertion

- Physical: Code, 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

- Operation modes: Eye diagram or continuous run
- Measurement of pulse width, rise time, fall time, level, overshoot and undershoot (positive and negative pulses)
- PASS / FAIL indications for ITU-T G.703 E1 mask

3. SYNCHRONIZATION

- Internal clock (better than ± 3.0 ppm)
- External ref. clock: 2,048 kb/s (ITU-T G.703), 2,048 kHz
- Configurable input gain: 0 dB, -20 dB



4. JITTER AND WANDER

4.1 Generation Function

- Modulation waveform: sinusoidal
- Modulation frequency range: 1 μ Hz to 100 kHz
- Modulation frequency resol.: 0.1 Hz (jitter), 1 μ Hz (wander)
- Modulation amplitude: 0 – 1000 UIpp. Max depends on modulation frequency
- Modulation amplitude resolution: 1 mUIpp or $1/10^4$
- Modulation amplitude accuracy: better than 0.172
- Smooth amplitude changes in jitter range (10 Hz – 100 kHz)
- Intrinsic jitter < 10 mUIpp

4.2 Jitter Analysis Function

- Closed loop phase measurement method. Reference 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 resettable), hits detection and count (user selectable threshold)
- Jitter measurement observation time: 1 s, 10 s, 60 s
- Measurement selectable filters: LP ($f < 100$ kHz), LP+HP1 ($20 \text{ Hz} < f < 100$ kHz), LP+HP2 ($18 \text{ kHz} < f < 100$ kHz), LP+RMS ($12 \text{ kHz} < f < 100$ kHz)

4.3 Wander Analysis Function

- Open loop measurement method. Reference freq. required.
- Modulation frequency range: 1 μ Hz 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

5. ITU-T G.703 CODIRECTIONAL

- Connector Balanced (RJ-45) 120 Ω .
- Bit rate N x 64 kb/s (N from 1 to 4)
- Test pattern generation / analysis over co-directional
- Defect insertion and analysis: LOS, AIS, LSS, All 0, All 1
- Anomaly insertion and analysis: TSE, Slip

6. CONTRADIRECTIONAL

- Contradirectional Clock Adapter

7. DATA COMMUNICATIONS

7.1 Connectors

- Smart Serial universal connector for all DTE / DCE

7.2 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

7.3 Tests

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

8. FRAME RELAY MONITORING

8.1 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

8.2 Settings

- DLCI

8.3 Events

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

8.4 Statistics

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

9. ANALOGUE TEST

- Tone Generation: 10 Hz to 4000 Hz, 0 dBm to -60 dBm
- Level and frequency
- ITU-T G.711 analysis: max code, min code, average code

10. GENERAL

- Min. Operation time with one battery pack: < 4.5 hours
- IP remote control through attached Ethernet port based on standard VNC for PC, iPhone, iPad, etc.
- Configuration / report storage, export through USB port
- TFT colour screen (480 x 272 pixels)
- Dimensions: 223 mm x 144 mm x 65 mm
- Weight: 1.0 kg (with rubber boot, one battery pack)

