



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

# Datasheet

# ALBEDO AT-2048

Probably the most advanced E1/Datacom tester ever built

## 1. ITU-T G.703 / E1 INTERFACE

### 1.1. CONNECTORS

- Port A: Unbalanced (BNC) 75 Ω balanced (RJ-45) 120 Ω
- Port B: Balanced (RJ-45) 120 Ω (AT-2048 only)
- Analogue voice frequency audio port

### 1.2. OPERATION MODES

	E1	Datacom
End-point	YES	YES
Monitor	YES	YES
Pass-through	YES	
Loop-back	YES	
Mux-Demux	YES	
Analogue	YES	

### 1.3. LINE

- Impedance: nominal, PMP 20 / 25 / 30 dB, high (>1000 Ω)
- Output freq offset within ±25,000 ppm
- 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

### 1.4. FRAME

- Unframed, G.704 / CRC / CAS / CRC + CAS
- Generation of custom NFAS spare bits
- CAS A, B, C, D bit generation for each voice channel
- Generation of CAS multiframe spare bits

### 1.5. TEST PATTERNS AND SIGNALS

- PRBS 9, PRBS 11, PRBS 15 , PRBS 20, PRBS 23 , 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 kbit/s, datacom interface

## 1.6. ANALYSIS

- Line attenuation (dB), freq (Hz), freq dev (ppm), rtd (μs)
- 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
- G.821: ES, SES, UAS, DM (Pass / Fail)
- G.826: ES, SES, UAS, BBE (Pass / Fail)
- M.2100: ES, SES, UAS, BBE (Pass / Fail)
- G.711 map analysis: max/min/avg code, TS level, freq
- CAS A, B, C, D bit analysis
- Drop to output: Analogue, 64 kbit/s codir, datacom

## 1.7. 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
- Modes: Single, rate, continuous, burst, M out of N

## 1.8. JITTER AND WANDER GENERATION

- Modulation waveform: sinusoidal
- Frequency range: 1 μHz to 100 kHz
- Resolution: 0.1 Hz (jitter), 1 μHz (wander)
- Amplitude: 0–1000 Uipp. max depends on modulation freq
- Modulation resolution: 1 mUipp or 1/10<sup>4</sup> configured value
- Modulation amplitude accuracy: better than 0.172
- Smooth amplitude in jitter range (10 Hz – 100 kHz)
- Intrinsic jitter < 10 mUipp

## 1.9. JITTER ANALYSIS FUNCTION

- Closed loop phase method (Ref. not required)
- Range: 0.1 Hz to 100 kHz (lock time 10 s), 1 Hz to 100 kHz (locking time 1 s), 10 Hz to 100 kHz (locking time < 1 s)
- Amplitude: 0 to 1000 Uipp (1 mUipp resolution)
- Accuracy: better than ITU-T O.172
- Results: peak to peak, RMS, max, hits detection, count
- Jitter measurement observation time: 1 s, 10 s, 60 s
- Filters: LP(< 100 kHz), LP+HP1 (20Hz<f<100kHz), LP+HP2 (18 kHz<f<100 kHz), LP+RMS (12kHz<f<100kHz)

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**1.10. WANDER ANALYSIS FUNCTION**

- Open loop measurement method (ref. 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
- Built in, real time analysis: TIE, MTIE, TDEV
- Statistics range: 10<sup>2</sup>, 10<sup>3</sup>, 10<sup>4</sup>, 10<sup>5</sup>, 10<sup>6</sup>s

**1.11. PULSE MASK ANALYSIS**

- Operation modes: eye diagram or continuous run
- Width, rise time, fall time, level, overshoot, undershoot
- Pass / Fail for compliance with ITU-T G.703 E1 mask

**2. G.703 NX64**

**2.1. CONNECTOR**

- Balanced (RJ-45) 120 Ω

**2.2. FEATURES**

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

**3. ANALOGUE TEST**

- Tone Generation (from 10 to 4000 Hz, from 0 to -60 dBm)
- Level, frequency
- ITU-T G.711 analysis: max code, min code, avg code

**4. FRAME RELAY MONITORING**

**4.1. INTERFACES**

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

**4.2. SETTINGS**

- DLCI

**4.3. EVENTS**

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

**4.4. STATISTICS**

- Bandwidth statistics
- Max, min frame size
- Frames with FECN, BECN, DE
- Active DLCI list
- LMI frame count

**5. DATA COMMUNICATIONS**

**5.1. CONNECTORS**

- Smart Serial Universal datacom connector for DTE / DCE

**5.2. INTERFACES**

- V.24/V.28 asynchronous (RS-232) from 50 bit/s to 128 kbit/s
- V.24/V.28 synchronous (RS-232) from 50 bit/s to 128 kbit/s
- X.21/V.11 from 50 bit/s to 2048 kbit/s
- V.35 from 50 bit/s to 2048 kbit/s

- V.36 (RS-449) from 50 bit/s to 2048 kbit/s
- EIA-530 from 50 bit/s to 2048 kbit/s

**5.3. TESTS**

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

**6. PLATFORM**

**6.1. GUI**

- Touch-screen, keyboard and mouse
- Full remote control with VNC
- SNMP and MIB support

**6.2. BATTERIES**

- Operation time with batteries (LiPO): 8 - 24 hours
- Battery recharge time (LiPO): 4 hours

**6.3. OPERATION**

- Operational range: -10°C to +50°C
- Operation humidity: 10% - 90%
- IP rating: 54
- Configuration, report storage and export through USB

**6.4. ERGONOMICS**

- TFT colour touch screen (480 x 272 pixels)
- Dimensions: 223 x 144 x 65 mm (8.8 x 5.6 x 2.5 inches)
- Weight: 1 kg

