

PCI Based Universal T1 E1 Cards Analysis and Emulation Hardware

T1 E1 Software Selectable
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Comprehensive Voice, Digits,
Fax, Data, Protocol, Analog,
Digital Analysis / Emulation
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Pulse Mask Display, Jitter
Generation and Measurement
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Thru and Crossport Modes for
Cabling Ease & Flexibility
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Full / Fractional Bert; Tx & Rx
Traffic—Voice, Digits, Tones
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Dual VF Interfaces –
600 Ω Source & Terminate
Impedances
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Non Intrusive Dual VF with
Drop and Insert, and
Dual T1 E1 Interfaces
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Call Capture and Analysis w/
Detail Call Data Records
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Windows Client Server for
remote analysis-Supports C++,
TCL, C# clients
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Automatic/Semi-Automatic
Echo Canceller Testing
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Overview

GL's Universal HD T1/E1 is an enhanced PCI Based T1 and E1 solution that utilizes familiar computer user interfaces, to provide comprehensive and versatile T1 or E1 testing capability at a competitive price. It is introduced with the following enhancements:

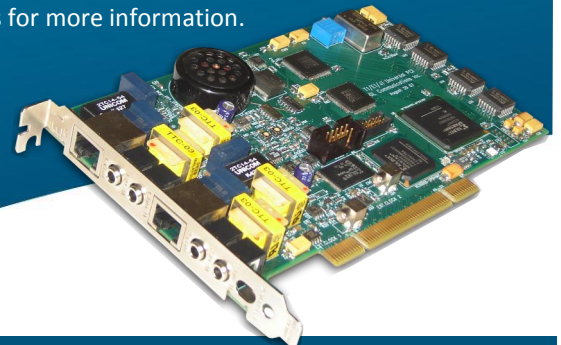
- Software Selectable T1 or E1 interfacing along with Drop and Insert
- Universal boards can be plugged into either a 5 V or 3.3 V PCI bus
- **Smaller Size** – The boards are smaller, with dimensions are 4.2" x 7.1" vs. the older boards 4.2" x 9.2".
- **High Density and High Speed** - The boards are significantly faster, and significantly more efficient than the older boards. The new boards use DMA and a 32-bit wide bus.
- Universal boards have adjustable transmit clock frequency (+ / - 300ppm) for testing frequency lock sensitivity of T1 or E1 equipment.
- **Supports two new port modes:** Cross-port through mode and cross-port transmit mode
- Features in-service monitoring and emulation of T1 and E1 circuit connections.
- Provides out-of-service troubleshooting such as bit-error-rate testing, alarm monitoring, signaling bit manipulation and recording, DTMF/MF generation and detection, and Drop and Insert capabilities.
- T1 E1 [Jitter Generation](#), [Jitter Measurement](#), and [Pulse Shape](#)
- [Voice Frequency \(VF\) Drop and Insert](#): Besides providing access to in-band PCM data, the T1 (E1) provides VF interface for monitoring and inserting audio with Drop and Insert. Users can connect to VF ports using 3.5mm unbalanced (or mono) audio cable, with standard 600 Ohms termination mode only.
- Windows® and Linux Drivers for Open Source Applications
- VF Tx Gains for Universal T1 E1 analyzer ranges from -7.2 dB to +18.2 dB in 0.1dB steps, and VF Rx Gains for Universal T1 E1 analyzer ranges from -18.0 dB to +7.3 dB in 0.1 dB steps.
- Provides convenient handset interface for voice over the T1 or E1 line.

Main Features

- Compatible with Windows® XP, 7 and 8 operating systems and user friendly real-time software
- Most all "[basic applications](#)" and "[special applications](#)" are available for Universal HD T1 E1 cards including comprehensive comprehensive Analysis / Emulation of Voice, Digits, Tones, Fax, Raw Data, Protocol, Analog, Digital, and Echo Testing
- Call Recording, Generation, & Monitoring for hundreds to thousands of calls in one platform
For more details, visit <http://www.gl.com/universalt1e1.html>

GL's offers other popular forms of T1 E1 analysis hardware such as [Octal/Quad T1 E1 Analyzer Boards](#) – 8/4 port PCIe based cards for higher scalability and performance, [Dual Express T1/E1 \(PCIe\) Boards](#) - high-density dual T1 or E1 boards with newer PCIe (x1) bus interface, Portable [USB T1 E1 Analyzer](#) with Dual T1 E1 ports & smallest form factor, [tProbe™ T1 E1 Analyzer](#) Unit - an enhanced version of USB based T1 E1 VF & Serial Data analyzer with future expansion capabilities. Please call us for more information.

PCI Based Universal T1 E1 Cards



 **GL Communications Inc.**

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Web Page Address: <http://www.gl.com/> (V) 301-670-4784 (F) 301-670-9187 E-Mail Address: gl-info@gl.com

Basic and Optional Applications

Available with user-friendly GUI for Windows® 7, Vista, and XP Operating Systems with support for almost all existing T1 E1 Analyzer applications including Comprehensive Analysis / Emulation of Voice, Data, Protocol, Analog, Digital, and Echo Testing. For detail information on the available applications for the Universal HD T1 E1 cards, please refer to <http://www.gl.com/t1e1applications.html> webpage.

Basic Software

VF Options

- Speaker
- Drop and Insert
- VF In / Out TS settings

Monitoring Options

- Monitor T1/E1 Line
- Byte Values & Binary Byte Values
- Signaling bits, Power Level, DC Offset, & Frequency
- Multi-frames, and Real-time Multi-frames
- T1/E1 Data as Real-time Bitmap
- Time-slot Window
- ASCII Timeslot Display
- Oscilloscope & Power Spectral
- Active Voice Level

Intrusive Testing

- Bit Error Rate Test
- Enhanced Bit Error Rate
- ATM BERT
- Transmit Tone
- Transmit Gaussian Noise
- Transmit Multiframe
- Transmit Signaling Bits
- Precision Delay Measurement
- Rx-to-Tx Loop back
- Error Insertion

Optional Software

Protocol Analysis

- ISDN, HDLC, SS7, GSM, GPRS, UMTS, GR303, V5.x
- Frame Relay, ATM, PPP, TRAU, CDMA, DCME, T1
- E1 Maintenance Data Link, (SaHDLC and SSM), SS1
- Facility Data Link, Fax, Modem

Protocol Emulation

- ISDN, SS7, ISUP Conformance Scripts, GSM Abis,
- GSM A, MAP, CAP, INAP, FXO FXS, MLPPP, CAS,
- TRAU, SS1, Multi-link Frame Relay Emulation
- Inverse Multiplexing over ATM

Windows Client / Server—w/ Remote access to T1/E1 server using Clients - C++, TCL, C#

- FXO FXS Simulation

Record / Playback Files—Manual, Automated

Capture, Analysis, & Emulation - DTMF / MF / MFCR2, Digits, Tones, Voice, Fax, Modem, Raw Data

Voice Band Analysis Software

Call Data Records

Multi-Channel BERT

Jitter Generation, Jitter Measurement, & Pulse Mask

Protocol Identifier, Traffic Classifier

Echo Cancellation Testing / Compliance -Manual, Semi-automated, & Automated – G.168, G.160, G.169

- Measure Loop Delay/ERL
- Delay Attenuate Timeslots
- Digital Echo Canceller Simulator
- Audio Processing Utility (APU)

Signaling Transitions Recording

Real-time Strip Chart

Real-time Multichannel Audio Bridge

Multiplex / Demultiplex Software

Network Surveillance, Voice Quality Testing



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PCI Based Universal T1E1 Card – Specification

Physical Interface

T1/E1 Signal	Dual RJ48c Connectors
Audio Signal	(4) 3.5 mm Unbalanced (or Mono) Audio Jacks (TX & RX)
External Clock	(2) MCX Coaxial Jack
PC Interface	PCI 2.1 Universal (3.3 V or 5.0 V)

Environmental Specifications

Temperature	Operating: 0 to 50° C Storage: -50 to 70° C
Relative Humidity	Operating: 10% to 90% (non-condensing) Storage: 0% to 95% (non-condensing)
Altitude	Operating: -100 to 12,000 ft. Storage: -100 to 40,000 ft.

T1/E1 Line Interface

Line Code Format	AMI, B8ZS (T1) or HDB3 (E1)
Framing Format	Unframed, D4 (T1), ESF (T1), ESF (J1), CAS (E1), FAS (E1), CRC4, (Future Enhancement: SLC96, T1ESF ZBTSI)
Bert Pattern Generation	Pseudorandom patterns: (63) 2 ⁶ -1, (511) 2 ⁹ -1, (2047) 2 ¹¹ -1, (32767) 2 ¹⁵ -1, (1048575) 2 ²⁰ -1, (8388607) 2 ²³ -1, QRSS. T1 In-Band Loop Code Generation and Detection, Fixed patterns: All Ones, All Zeros, 1:1, 1:7, 3 in 24. Hardware Compliant: User pattern of up to 32 bits in length International, National & Extra Bits: User Defined (E1)
Display and Logging	Bit Errors, Bit Error Rate, Error Seconds, Error Free Seconds, %EFS, Severely Error Seconds, %SES, Degraded Minutes, %Dmin, Loss Pattern Sync Count, Loss of Sync Seconds, Available Seconds, %Available Seconds, Unavailable Seconds, Bipolar Violations, BPV Rate, BPV Seconds, BPV Free Seconds, Frame Errors, FE Rate, FE Seconds, FE Free Seconds, with Detailed logging into disk file.

T1/E1 Line Interface (contd.)

	Resync In Progress, Loss of Signal, Blue Alarm, Change of Frame Alignment, Bipolar Violation, Frame Error, Carrier Loss, Yellow Alarm, Out of Frame Events Counter, Error Super frame Counter, Bipolar Violations, Remote Alarm, Distant Multiframe Alarm, Signaling All Ones, CAS Multiframe Error, CRC4 Error.
Drop and Insert	Any contiguous set of digital timeslots and/or audio input
Facility Data Link	T1 ESF Mode: Transmit/Receive Messages, Bit-Oriented Messages, and Files.
Zero Suppression	B7 Stuffing, Transparent, & B8ZS (T1)
Loopbacks	Normal (Outward and Inward), Through mode and Cross-Port loop back
Transmit	
T1/E1 Interface	Hardware Compliant: ANSI: T1.403.1995, T1.231-1993, T1.408 AT&T: TR54016, TR62411 ITU: G.703, G.704, G.706, G.736, G.775, G.823, G.932, I.431, O.151, Q.161 ITU-T: Recommendation I.432-03/93 B-ISDN User -Network Interface-Physical Layer Specification ETSI: ETS 300 011, ETS 300 166, ETS 300 233, CTR12, CRT4 Japanese: JTG.703, JTI.431, (Future enhancement - JJ-20.11 - CMI Coding Only)
T1 Output Level	T1: 3.0V Base to Peak Selectable 0-655Ft Pulse Equalization Setting
E1 Output Level	E1: 3.0V ±0.3V Base to Peak
Frequency Offset	E1: +/- 615 Hz T1: +/- 464 Hz
Line Built out Selections	0dB, -7.5dB, -15dB, -22.5dB for T1 only
Tx Capability	DSX-1 Outputs (to 655 feet)
Alarm Insertion	Blue, Yellow, Remote, Distant Multiframe, Bit 7 Zero Suppression D4 Yellow: 1 in S bit of frame 12 AIS-CI Code ESF-RAI CI Code Carrier Loss
Error Insertion	BPV, Bit Error, Frame Error, CRC Errors, Burst Frames, Fixed Error Rate, Random Error Rate, auto logic from 10-2 to 10-9 for selectable 56K or 64Kps channels.



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PCI Based Universal T1E1 Card – Specification (Contd...)

Transmit (Contd.)

Internal Clock Specification	Standard: +/- 3ppm Optional: +/- 1ppm
Output Clock Source / Synchronization Options	Internal, Recovered, External Clock

Receive

Input Impedance	100 ohms for Terminate and Monitor (T1) 120 ohms for Terminate and Monitor (E1) > 1K ohms for Bridge
Terminations	Terminate, Monitor, Bridge
T1 Input Frequency	1.544MHz +/- 20 KHz
E1 Input Frequency	2.048Mhz +/- 20 KHz
Frequency Measurement	+/- 1ppm
Error Detection	Frame Error, CRC Error, BPV Error, Logic Error, Frame Alignment Error Hardware Compliant: * 10 or 24 bits for sync time * 2/4, 2/5, or 2/6 frame bit in error frame select * Frame error bit corruption for 1 or 3 frame bits * E-Bit Error * Line Code Violation * Path Code Violation
Alarm Detection	D4 Yellow Alarm, ESF Yellow Alarm Hardware Compliant: J1 Yellow Alarm
Input Range	T1: Terminate – 0 to 36dB (Long Haul), Monitor, Bridge Monitor – 20dB, 26dB E1: Terminate – 0 to 43dB (Long haul), Monitor, Bridge Monitor – 20dB, 26dB
Intrinsic Jitter	Jitter Tolerance: Meets AT&T TR 62411 (Dec. 90) and Meets ITU-T G.823 Jitter Transfer: Meets AT&T TR 62411 (Dec. 90)

Buyer's Guide

[HTE001](#) – Universal HD T1/E1 Cards

[HUT001](#) – Basic Universal HD T1 Software

[HUE001](#) – Basic Universal HD E1 Software

For complete buyers' list visit <http://www.gl.com/t1e1applications.html#BuyerGuide>

PCM Interface

Transmit	Synthesized Tone: 15 Hz to 3975 Hz selectable in 1Hz steps, +3.0dBm to -40dBm in 0.1 steps selectable, Frequency sweep. Dual Tone: Single or any combination of tones. Supervision: User defined states of A, B, (C, D) bits. Signaling: DTMF/MF Dialing Digits, ISDN, MFC-R2 File Playback: User created or recorded file. Special Codes: Milliwatt Codes, CSU Loop Up/Down Codes.
Receive	Displays for All Channels: Signaling Bits, Power Level, Frequency, and Data. Graphical displays: Oscilloscope, Spectral, Spectrogram, Signal-to-Noise Signaling: DTMF/MF Dialed Digit Detection and Analysis, ISDN, MFC-R2 Recorder: Record Full/Fractional T1/E1/J1 Timeslots to hard disk file.

VF Audio Interface

Refer to [VF Drop and Insert Capabilities](#) webpage for more details

Transmit	Level: 0.0dBm +/- 0.1dBm Range: -7.2 dB to +18.2 dB selectable gain in 0.1 dB steps Output Impedance: 600 Ohms nominal
Receive	Audio Monitoring: Built-in Speaker. Audio Insertion: Selected DS0 replaced with inserted audio from VF Input Range: 18.0 dB to +7.3 dB selectable gain in 0.1 dB step. Volume Control: User specified software controller Input Impedance: 600 ohms nominal
Connectors	(4) 3.5 mm Unbalanced (or Mono) Audio Jacks (TX & RX)

External Clock Interface

Input/Output Level	TTL Level tolerant
Input/Output Impedance	50 Ohms nominal

Physical Dimensions

Dimensions	7.1 inches (L) x 4 .2 inches (W)
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