

# Dual T1E1 Express (PCIe) Analysis & Emulation Boards

## Analysis and Emulation Hardware

### T1 E1 Software Selectable



### 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



### Non Intrusive Dual VF Interfaces Source and Terminate Impedances – 135, 150, 600, 900 Ω



### High Impedance (>50K Ohms), and external Microphone and Headset



### VF Sampling Rates – 8 kHz to 96 kHz and Data Widths of 8 to 32 bits



### VF Drop and Insert



### Overview

GL's **Dual T1 E1 Express (PCIe) Boards** are high-density dual T1 or E1 boards with newer PCIe (x1) bus interface. These cards are identical to the portable tProbe™ units, except for FXO FXS and Datacom functionality.

- Software Selectable T1 or E1 interfacing along with Drop and Insert
- PCI Express x1 Lane/Board
- Monitor the T1/E1 line conditions such as frame errors, violations, alarms, frequency, power level, and clock (or frame/bit) slips.
- TDM, ISDN, SS7 – High Density Voice
- VoIP, Frame Relay, Multilink Frame Relay, PPP and Multilink PPP, HDLC
- Routing and Bridging emulation over Multi T1/E1 WAN interfaces using MLPPP (Multi Link PPP) and MFR (Multi Link Frame relay) protocols
- Comprehensive Analysis / Emulation of Voice, Data, Fax, Protocol, Analog, and Digital signals, including Echo and Voice Quality testing
- Supports [T1 E1 Pulse Mask](#) and [Jitter Generation and Measurement Analysis](#)
- "Cross-port Through" and "Cross-port Transmit" Modes – these configurations make cabling with Drop/Insert and Fail-Safe Inline Monitoring very easy
- Enhanced [VF Drop and VF Insert Capabilities](#) using 3.5mm Balanced (Stereo), or Unbalanced (Mono) physical connections.
- The VF Tx and Rx impedance for Dual T1 E1 Express (PCIe) Card analyzer supports software selectable 135, 150, 600, or 900 Ohm terminations.
- Windows and Linux Drivers for Open Source Applications
- Includes individual speakers (one speaker per card).
- Supports software selectable VF Tx and Rx impedances - 135, 150, 600, or 900 Ohm terminations. Additionally, the VF Rx impedance supports New High Impedance Monitor Termination (>50K Ohms), and external Microphone and Headset (Mic/HS) impedance.
- VF Tx Gains ranges from -12 dB to +59.5 dB in 0.5 dB steps, and VF Rx Gains ranges from -63.5 dB to +9 dB in 0.5 dB steps.

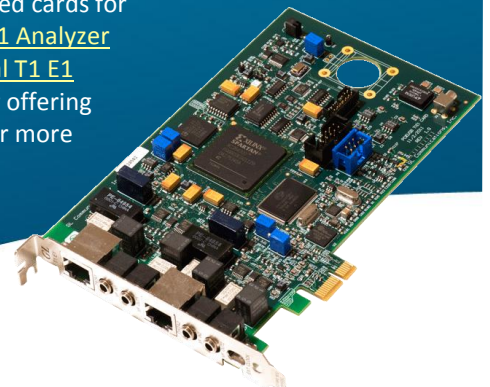
### Main Features

- 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 tProbe™ T1 E1 analyzer including comprehensive Analysis / Emulation of Voice, Digits, Tones, Fax, Modem, 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/dual-t1-e1-pcie-boards.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, Portable [USB T1 E1 Analyzer](#) with Dual T1 E1 ports & smallest form factor, [Universal T1 E1 Analyzer Boards](#) - a dual port PCI based T1 E1 analyzer offering higher speed and smaller dimensions. Please call us for more information.

....the future of T1 E1 VF  
Data Analysis / Emulation



 **GL Communications Inc.**

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## Basic and Optional Applications

### 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
- Simplifies Audio Client (SAC)

#### Windows Client / Server

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

### Optional Software

#### Protocol Analysis

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

#### Protocol Emulation

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

#### WCS Modules

- Tx/Rx files, digits, Protocol Emulation
- Multi-channel BERT,
- DSP operations, Dynamic DSP capability
- FAX Emulation over T1/E1 and Analog Lines

#### 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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## Dual T1E1 Express (PCIe) – Specification

### Physical Interface

T1/E1	Dual RJ48c Connectors
Audio Signal	(4) 3.5 mm Balanced (Stereo) or Unbalanced (or Mono) Audio Jacks (TX & RX)
PC Interface	PCI Express x1 Lane Compliant to PCI Express Base Specification v1.1
External Clock Connector	(1) MCX Coaxial Jack

### 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

Framing Formats	Unframed, D4 (T1), ESF(T1), ESF(J1), CAS(E1), FAS(E1), CRC4 Hardware Compliant: SLC96, T1ESF ZBTISI
Line Code format	AMI, B8ZS (T1) or HDB3 (E1)
Internal Clock Specification	Standard: +/- 3ppm Optional: +/- 1ppm
Output Clock Source	Internal (+/- 1 ppm or 3 ppm), Recovered, External Clock
T1 Output Level	T1: 3.0V Base to Peak Selectable 0-655Ft Pulse Equalization Setting; Tx Capability - DSX-1 Outputs (to 655 feet)
E1 Output Level	E1: 3.0V ± 0.3V Base to Peak
Input Level	75 mV to 6V base to peak or -30 dBsx to -6 dBsx
Line Built-Out Selections	0dB, -7.5dB, -15dB, -22.5dB for T1 only
Loopback	Normal (Outward and Inward) Cross-Port Transmit Loopback Cross-Port Through Loopback

### 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. 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, & 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 Timeslots to hard disk file.

### Transmit

T1/E1 Interface Hardware Compliance	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 Spec ETSI: ETS 300 011, ETS 300 166, ETS 300 233, CTR12, CRT4 Japanese: JTG.703, JTI.431, JJ-20.11 (CMI Coding Only)
BERT Pattern Generation	Pseudorandom patterns: (63) 2 <sup>6</sup> -1, (511) 2 <sup>9</sup> -1, (2047) 2 <sup>11</sup> -1, (32767) 2 <sup>15</sup> -1, (1048575) 2 <sup>20</sup> -1, (8388607) 2 <sup>23</sup> -1, QRSS. Hardware Compliant: T1 In-Band Loop Code Generation and Detection Fixed patterns: All Ones, All Zeros, 1:1, 1:7, 3 in 24, User Defined 24- Bits Hardware Compliant: User pattern of up to 32 bits in length
Alarm Insertion	Blue, Yellow, Remote, Distant Multiframe Hardware Compliant: Bit 7 Zero Suppression D4 Yellow: 1 in S bit of frame 12, AIS-CI Code, ESF-RAI CI Code Receive Carrier Loss: 0's for 2047 or 255 bits (For E1 only)
Error Insertion	BPV, Bit Error, Frame Error, CRC Errors, Burst Frames, Fixed Error Rate, Random Error Rate, auto logic from 10 <sup>-2</sup> to 10 <sup>-9</sup> for selectable 56K or 64Kps channels.
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)
Signaling	Robbed-Bit or Clear Channel
Frequency	T1: +/- 615 Hz
Offset	E1: +/- 615 Hz



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## Dual T1E1 Express (PCIe) – Specification (Contd...)

### 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
Alarm Detection	T1 – D4 Yellow Alarm, ESF Yellow Alarm Yellow Alarm (B2 Suppressed-2nd MSB) Yellow Alarm (S-Bit) Yellow Alarm (00FF in FDL) Blue Alarm (Framed or Unframed All Ones) E1 - Remote Alarm Distant Multi-Frame Alarm Signaling All Ones Unframed All Ones Hardware Compliant: J1 Yellow Alarm
Intrinsic Jitter	Meets Jitter Tolerance: Meets AT&T TR 62411 (Dec. 90) Meets ITU-T G.823 Jitter Transfer: Meets AT&T TR 62411 (Dec. 90)
Input Range	T1: Terminate, 0 to 36dB (Long Haul), DSX Monitor, Bridge Hardware Compliant: Terminate, 0 to 15dB (Limited Long Haul), DSX Monitor 20 dB, 26 dB, 32 dB E1: Terminate, 0 to 43dB (Long Haul), DSX Monitor, Bridge Hardware Compliant: Terminate, 0 to 13 dB

### Physical Dimensions

Dimensions 6.7 inches x 4.4 inches

### Display and Logging

BERT	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.
Alarms	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.

### VF Drop and Insert

Transmit	Signal Level Measurement Accuracy: 0.0dBm +/- 0.1dBm. Range: -7.2 dB to +18.2 dB selectable gain in 0.1 dB steps Output Impedance: 135, 150, 600, 900 Ohms
Receive	Audio Monitoring: Built-in Speaker. Audio Insertion: Selected DSO 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: Software selectable 135, 150, 600, 900 Ohms for Intrusive Testing. High Impedance (>50K Ohms) for Non-Intrusive Testing. Provision for external Microphone (Mic/HS) on VF ports connection
Sampling Rates	8KHz, 16KHz
Datawidth (bits)	Supports 8, 16, 20, 24, 32 Bit Data
VF Tx Gains	Supports -12 dB to +59 dB in 0.5dB Steps Gain (0.1 dB steps can also be accommodated)
VF Rx Gains	Supports -63.5 dB to +9 dB in 0.5dB Steps Attenuation (0.1 dB steps can also be accommodated)
Connectors	(4) 3.5 mm Balanced (Stereo) or Unbalanced (Mono) Audio Jacks (Tx & Rx)

### Buyer's Guide

[XTE001](#) – Dual Express (PCIe) T1 E1 Boards

[XUT001](#) – Dual T1 E1 Express Card Basic T1 Software

[XUE001](#) – Dual T1 E1 Express Card Basic E1 Software

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



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