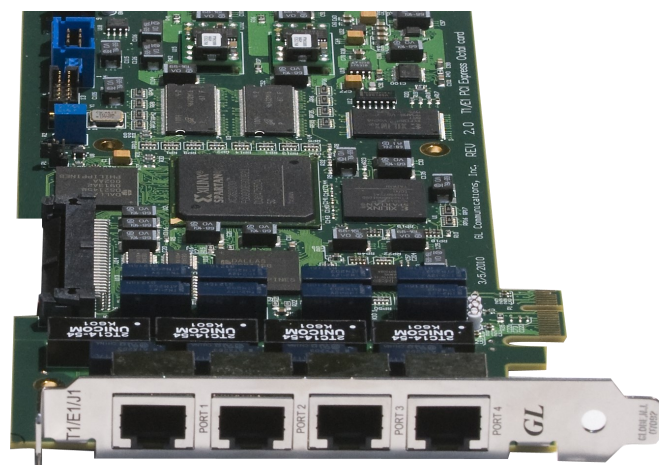


# PCIe Based Octal and Quad T1 E1 Boards

(Analysis and Emulation Hardware)



Octal PCIe Card



Quad PCIe Card

## Overview

GL's T1 E1 Quad and Octal Cards provide multiple ports for analyzing and emulating TDM networks. Multiple of these PCIe cards can be placed in a single server grade PC for enhanced scalability.

Comprehensively emulate and analyze voice, data, fax, analog and digital signals, including echo and Voice Quality with GL's Quad and Octal cards. These high performance PCIe cards can send tones and digits, perform bit error rate testing, record and playback traffic over T1 E1 lines and give full visibility into all time slots on all T1 E1 ports. Furthermore, the cards can analyze many common protocols such as ISDN, ATM, HDLC, MTP2, LAPD, SS7, PPP, GSM, GSM Abis, TRAU, and Frame Relay.

The Quad and Octal Cards can also emulate these protocols and generate traffic onto the T1 E1 networks. Multiple Quad and Octal cards can be placed in a single server grade PC and controlled from the same software application. This provides the user the ability to monitor many T1 E1 lines and hundreds of DS0s carrying voice and data.

For more details, visit [T1 E1 Quad and Octal Analysis and Emulation Hardware](#) webpage.

## Main Features

- PCI Express x1 Lane/Board
- Octal boards are compatible with dual and quad core motherboards and software that simulate dual and quad cores (hyper-threading)
- High Density Applications, up to 64 T1 E1s in a Rack PC. The boards (with Direct Memory Access) are significantly faster and significantly more efficient
- TDM, ISDN, SS7 – High Density Voice
- Port T1 E1 Mother Board w/ 4-Port T1 E1 Daughter Card
- Terminate and High Impedance Interfaces and Compatible with almost all T1 E1 Applications
- All Most all basic applications and special applications are available for Quad and Octal T1 E1 cards including comprehensive Analysis / Emulation of Voice, Digits, Tones, Fax, Modem, Raw Data, Protocol, Analog, Digital, and Echo Testing
- Capable of simulating as well as decoding and demodulating fax calls over T1 E1 lines using [Fax Simulator](#) and [FaxScan™](#)
- Call Recording, Generation, and Monitoring for hundreds to thousands of calls in one platform
- User-friendly GUI within Windows® 10 OS
- Windows® and Linux Drivers for Open Source Applications
- Routing and Bridging emulation over Multi T1 E1 WAN interfaces using MLPPP (Multi Link PPP) and MFR (Multi Link Frame relay) protocols



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## tProbe™ T1 E1 Analyzer – Basic and Optional Applications

Available with user-friendly GUI for Windows® 10 OS with support for almost all existing T1 E1 Analyzer applications including comprehensive analysis / emulation of Voice, Data, Fax, Protocol, Analog, Digital, and Echo Testing.

For detail information on the available applications for the Portable USB based T1 E1 units, refer [T1 E1 Basic and Optional Applications](#) webpage.

### Basic Software

- VF Options
  - Speaker
  - Drop and Insert
  - VF In / Out TS settings
- Monitoring Options
  - Monitor T1 or E1 Line
  - Byte Values and Binary Byte Values
  - Signaling bits, Power Level, DC Offset and Frequency
  - Multi-frames and Real-time Multi-frames
  - T1 E1 Data as Real-time Bitmap
  - Time-slot Window
  - ASCII Timeslot Display
  - Oscilloscope and Power Spectral
  - Audio Monitoring
  - 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 (Sa HDLC and SSM), Facility Data Link, SS1, 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# and modules include:
  - Tx/Rx files, digits, Protocol Emulation
  - Multi-channel BERT,
  - DSP operations, Dynamic DSP capability
  - FAX Emulation over T1 E1 and Analog Line
- Record / Playback Files
  - Manual, Automated
- Capture, Analysis, and Emulation
  - DTMF / MF / MFRCR2, Digits, Tones, Voice, Fax, Modem, Raw Data
- Voice Band Analysis Software
- Call Data Records
- Multi-Channel BERT
- Protocol Identifier, Traffic Classifier
- Echo Cancellation Testing / Compliance
  - Manual, Semi-automated and 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

## Quad and Octal T1 E1 Boards– Specifications

### Physical Interface

T1 E1 Signal	RJ48c Connectors – Four (4) or Eight (8) per board
PC Interface	PCI Express X1 Lane Compliant to PCI Express Base Specification v1.1

### Physical Dimensions

Main Board	7.7 inches x 4.4 inches PCIe X1 Connector Interface to PC
Daughter Board	3.8 inches x 4.2 inches Without PC Interface

### 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.

### 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
Line Built out Selections	0dB, -7.5dB, -15dB, -22.5dB
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

## Transmit (Contd.)

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
Line Built out Selections	0dB, -7.5dB, -15dB, -22.5dB
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

## 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
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 and Extra Bits: User Defined (E1)
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.
Loopbacks	Normal (Outward and Inward), Cross-Port Transmit Loopback, Cross-Port Through Loopback
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.  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.

## Receive

Input Impedance	100Ω for Terminate and Monitor (T1) 120Ω for Terminate and Monitor (E1) >1KΩ 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	T1 – D4 Yellow Alarm, ESF Yellow Alarm Hardware Compliant: J1 Yellow Alarm
Input Range T1	Terminate: 0 to 36 dB (Long haul) Monitor Bridge Hardware Compliant: Monitor – 26 dB +/- 2.5dB
Input Range E1:	Terminate: 0 to 43 dB (Long haul) Monitor Bridge Hardware Compliant: Monitor – 26 dB +/- 2.5dB
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)

## PCM Interface

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

## Miscellaneous

Propagation Delay Simulation	Up to 2 Seconds
Precision Delay Measurement	Up to 8 Seconds

## Buyer's Guide

Item No	Product Description
<a href="#">FTE001</a>	QuadXpress T1 E1 Main Board (Quad Port– requires additional licenses)
<a href="#">ETE001</a>	QuadXpress T1 E1 (Daughter Board)

**Note:** PCs which include GL hardware/software require Intel or AMD processors for compliance.

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