

# PCI based Universal T1 E1 Cards

(Analysis and Emulation Hardware)



## Overview

GL's Universal HD T1 or 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 , 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 or 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  $\Omega$  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 or 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

For more details, visit [Dual HD Universal T1 E1 Card - \(PCI\)](#) webpage.



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## Main Features

- Compatible with Windows® 10 OS 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, and Monitoring for hundreds to thousands of calls in one platform
- 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

## 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 or 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 or E1 server using Clients - C++, TCL, C#
- Record / Playback Files
  - Manual, Automated
- Capture, Analysis, and Emulation
  - DTMF / MF / MFCR2, 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

## PCI based Universal T1 E1 Card – Specifications

### Physical Interface

T1 or E1	Dual RJ48c Connectors
Audio Signal	(4) 3.5 mm Balanced (Stereo) or Unbalanced (or Mono) Audio Jacks (Tx and 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.

### Physical Dimensions

Dimensions	7.1 inches (L) x 4.2 inches (W)
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### T1 or E1 Line Interface

Framing Formats	Unframed, D4 (T1), ESF(T1), ESF(J1), CAS(E1), FAS(E1), CRC4 Hardware Compliant: SLC96, T1ESF ZBTSI
Line Code format	AMI, B8ZS (T1) or HDB3 (E1)
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. 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)
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
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 and B8ZS (T1)
Loopbacks	Normal (Outward and Inward), Through mode and Cross-Port loop back

## Transmit

T1 or E1 Interface Hardware Compliance	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
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
Error Insertion	BPV, Bit Error, Frame Error, CRC Errors, Burst Frames, Fixed Error Rate, Random
Internal Clock Specification	Standard: +/- 3ppm Optional: +/- 1ppm
Output Clock Source / Synchronization Options	Internal, Recovered, and External Clock

## 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
Alarm Detection	D4 Yellow Alarm, ESF Yellow Alarm 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 <ul style="list-style-type: none"> <li>• 0 to 36dB (Long Haul), Monitor, Bridge Monitor</li> <li>• 20dB, 26dB</li> </ul> E1: Terminate <ul style="list-style-type: none"> <li>• 0 to 43dB (Long haul), Monitor, Bridge Monitor</li> <li>• 20dB, 26dB</li> </ul>

## 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 Drop and Insert

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

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: 135Ω, 50Ω, 600Ω, 900Ω
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 135Ω, 50Ω, 600Ω, 900Ω for Intrusive Testing. High Impedance (>50KΩ) for Non-Intrusive Testing. Provision for external Microphone (Mic/HS) on VF ports connection
Connectors	(4) 3.5 mm Balanced (Stereo) or Unbalanced (Mono) Audio Jacks (Tx and Rx)

## External Clock Interface

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

## Buyer's Guide

Item No	Product Description
<a href="#">HTE001</a>	Universal HD T1/E1 Cards
<a href="#">HUT001</a>	Basic Universal HD T1 Software
<a href="#">HUE001</a>	Basic Universal HD E1 Software

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