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Product Lifecycle Management System

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Tektronix Logic Analyzers

► TLA7Nx/Px/Qx Logic Analyzer Modules



Breakthrough Solutions for Real-time Digital Systems Analysis

Today's digital design engineers face daily pressures to speed new products to the marketplace. The TLA7Nx/Px/Qx Series logic analyzer modules answer the need with breakthrough solutions for the entire design team, providing the ability to quickly monitor, capture and analyze real-time digital system operation in order to debug, verify, optimize and validate digital systems.

Hardware developers, hardware/software integrators and embedded software developers will appreciate the range of capabilities of the TLA7Nx/Px/Qx Series logic analyzer modules. Its broad feature set includes capturing and correlating elusive hardware and software faults; providing simultaneous state and high-speed timing analysis through the same probe; using deep state acquisition to find the cause of complex problems; real-time, non-intrusive software execution tracing that correlates to source code and to hardware events; and non-intrusive probing.

The TLA7Nx/Px/Qx Series logic analyzer modules offer Tektronix' breakthrough MagniVu technology for providing high-speed sampling (up to 2 GHz) that dramatically changes the way logic analyzers work and enables them to provide startling new measurement capabilities.

The TLA7Nx/Px/Qx modules offer high-speed state synchronous capture and high-speed timing capture through the same set of probes. They capitalize on MagniVu technology to offer 500 ps timing on all channels, glitch and setup/hold triggering and display, and timestamp that is always on at up to 500 ps resolution.

The TLA700 Series logic analyzer modules are ideal for timing analysis, multi-processor/bus applications, and embedded software analysis.

► Features & Benefits

34/68/102/136 Channel Logic Analyzers with up to 128 Mb Depth

MagniVu™ Acquisition Technology Provides 2 GHz (500 ps) Timing Resolution to Find Difficult Problems Quickly

Up to 200 MHz State Acquisition Analysis of Synchronous Digital Circuits

Simultaneous State and High-speed Timing Analysis Through the Same Probe Pinpoints Elusive Faults Without Double Probing

500 MHz Deep Timing Analysis with Up to 128 Mb Per Channel

Glitch and Setup/Hold Triggering and Display Finds and Displays Elusive Hardware Problems

Transitional Storage Extends the Signal Analysis Capture Time

Broad Processor and Bus Support

Full Range of General-Purpose and High-density, Non-intrusive Probes

► Applications

Hardware Debug and Verification

Processor/Bus Debug and Verification

Embedded Software Integration, Debug and Verification

Tektronix Logic Analyzers

► TLA7Nx/Px/Qx Logic Analyzer Modules

► Characteristics

General

Number of Channels (all channels are acquired including clocks) –

TLA7N1: 34 channels (2 are clock channels).

TLA7N2, TLA7P2: 68 channels (4 are clock channels).

TLA7N3: 102 channels (4 are clock and 2 are qualifier channels).

TLA 7N4, TLA 7P4: 136 channels (4 are clock and 4 are qualifier channels).

Channel Grouping – No limit to number of groups or number of channels per group (all channels can be reused in multiple groups).

TLA700 Module “Merging” – Three 102-Channel or 136-Channel modules can be “merged” to make up to a 408-Channel module. Merged modules exhibit the same depth as the lesser of the three individual modules. Word/range/setup-and-hold/glitch/transition recognizers span all three modules. Only one set of clock connections is required.

Time Stamp – 50-Bit at 500 ps resolution (6.5 day range).

Clocking/Acquisition Modes – Internal, internal 2X, external. 2 GHz MagniVu high-speed timing is available simultaneous with all modes.

Number of Mainframe Slots Required per TLA700 Module – 2.

Input Characteristics (with P6417, P6418 or P6434 probes)

Capacitive Loading – 1.4 pF typical data; 2 pF typical clock (P6418).

2 pF typical data and clock (P6417 & P6434).

Threshold Selection Range – From +5.0 V to –2.0 V in 50 mV increments.

Threshold Selection Channel Granularity –

Separate selection for clock (1) and data (16) for each 17-Channel probe connector.

Threshold Accuracy (including probe) – ±100 mV.

Input Voltage Range – Operating: 6.5 V_{p-p} centered around the programmed threshold.

Non-destructive: ±15 V.

Minimum Input Signal Swing – 250 mV or 25% of signal swing, whichever is greater (P6417 & P6418). 300 mV or 25% of signal swing (P6434).

Input Signal Minimum Slew Rate –

200 mV/ns typical.

State Acquisition Characteristics (with P6417, P6418 or P6434 probes)

State Clock Rate – 100 MHz standard, 200 MHz optional.

State Data Rate (half/full channels) – 400/200 Mb/s, typical. Requires 200 MHz state option.

State Memory Depth with Timestamps – 64 Kb, 256 Kb, 1 Mb, 4 Mb, 16 Mb or 64 Mb per channel.

Setup-and-hold Time Selection Range – From 8.5 ns before, to 7.0 ns after clock edge.

Setup-and-hold Window – 2.0 ns typical.

Minimum Clock Pulse Width – 2 ns.

Active Clock Edge Separation – 5 ns.

Demux Channel Selection – Channels can be demultiplexed to other channels through user interface with 8-Channel granularity.

Timing Acquisition Characteristics (with P6417, P6418 or P6434 probes)

MagniVu Timing – 500 ps.

MagniVu Timing Memory Depth – 2 Kb (2048) per channel.

Deep Timing Resolution (half/full channels) – 2/4 ns to 50 ms.

Deep Timing Resolution with Glitch Storage Enabled – 10 ns to 50 ms.

Deep Timing Memory Depth (half/full channels with timestamps and with or without transitional storage) – 128/64 Kb, 512/256 Kb, 2/1 Mb, 8/4 Mb, 32/16 Mb, 128/64 Mb per channel.

Deep Timing Memory Depth with Glitch Storage Enabled – Half of default main memory depth.

Channel-to-channel Skew – <1 ns typical.

Minimum Recognizable Pulse Width (single channel) – 2 ns.

Minimum Recognizable Glitch Width (single channel) – 2 ns.

Minimum Recognizable Multi-channel Trigger Event – Sample period +2 ns.

Trigger Characteristics

Independent Trigger States – 16.

Maximum Independent If/then Clauses per State – 16.

Maximum Number of Events per If/then Clause – 8.

Maximum Number of Actions per If/then Clause – 8.

Maximum Number of Trigger Events – 18 (2 counter/timers plus any 16 other resources).

Number of Word Recognizers – 16.

Number of Range Recognizers – 4.

Number of Transition Recognizers – 1.

Number of Counter/Timers – 2.

Trigger Event Types – Word, group, channel, transition, range, anything, counter value, timer value, signal, glitch, setup-and-hold violation.

Trigger Action Types – Trigger module, trigger all, store, don't store, start store, stop store, increment counter, reset counter, start timer, stop timer, reset timer, goto state, set/clear signal, do nothing.

Trigger Sequence Rate – DC to 250 MHz (4 ns).

Counter/Timer Range – 51 Bits each (>100 days at 4 ns).

Counter Rate – DC to 250 MHz (4 ns).

Timer Clock Rate – 250 MHz (4 ns).

Counter/Timer Latency – None (can be tested or reset immediately after starting).

Range Recognizers – Double bounded (can be as wide as any group, must be grouped according to specified order of significance).

Setup-and-hold Violation Recognizer Setup

Time Range – From 8 ns before to 7 ns after clock edge in 0.5 ns increments.

Setup-and-hold Violation Recognizer Hold

Time Range – From 7 ns before to 8 ns after clock edge in 0.5 ns increments.

Trigger Position – Any data sample.

MagniVu Trigger Position – MagniVu data is centered around the module trigger.

Storage Control (data qualification) – Global (conditional), by state (start/stop), by trigger action, or transitional.

Storage Window Granularity – Single sample or block-of-31 samples before and after.

Physical Characteristics

Dimensions	mm	in.
Height	262	10.3
Width	61	2.4
Depth	381	15
Weight	kg	lb.
Net (w/o probes)	3.1	6.7
Shipping (typical)	6.3	13.7

P6417 Probe Cable Length – 1.8 m (6 ft.).

P6418 Probe Cable Length – 1.9 m (6.25 ft.).

P6434 Probe Cable Length – 1.5 m (5 ft.).

All three probes have the same electrical length.

► Ordering Information

TLA7Nx/Px/Qx Logic Analyzer Modules

Includes: Probe retainer bracket, probe manual, user manual, certificate of calibration, one-year warranty (return to Tektronix).

Probes must be ordered separately – Order Opt. 1P (P6418) or Opt. 2P (P6434) or Opt. 3P (P6417). You can also choose to order any combination and quantity of probes by ordering the P6418, P6434 or P6417 individually.

TLA7N1 – 34-Channel Logic Analyzer module, 2 GHz timing, 100 MHz state, 64 K depth (must select one probe option below). Options for up to 4 M depth and/or 200 MHz state.

TLA7N2 – 68-Channel Logic Analyzer module, 2 GHz timing, 100 MHz state, 64 K depth (must select one probe option below). Options for up to 4 M depth and/or 200 MHz state.

TLA7N3 – 102-Channel Logic Analyzer module, 2 GHz timing, 100 MHz state, 64 K depth (must select one probe option below). Options for up to 4 M depth and/or 200 MHz state.

TLA7N4 – 136-Channel Logic Analyzer module, 2 GHz timing, 100 MHz state, 64 K depth (must select one probe option below). Options for up to 4 M depth and/or 200 MHz state.

TLA7P2 – 68-Channel Logic Analyzer module, 2 GHz timing, 100 MHz state, 16 M depth (must select one probe option below). Option for up to 200 MHz state.

TLA7P4 – 136-Channel Logic Analyzer module, 2 GHz timing, 100 MHz state, 16 M depth (must select one probe option below). Option for up to 200 MHz state.

TLA7Q2 – 68-Channel Logic Analyzer module, 2 GHz timing, 100 MHz state, 64 M depth (must select one probe option below). Option for up to 200 MHz state.

TLA7Q4 – 136-Channel Logic Analyzer module, 2 GHz timing, 100 MHz state, 64 M depth (must select one probe option below). Option for up to 200 MHz state.

Logic Analyzer “N, P & Q” Module Probe Options

Opt. 1P – Add full complement of P6418 17-Channel general-purpose probes (each includes two 8 channel leadsets, one 1-Channel leadset, 20 SMT KlipChip™ grabber tips).

Opt. 2P – Add full complement of P6434 34-Channel high-density probe(s).

Opt. 3P – Add full complement of P6417 17-Channel general-purpose probes that allow you to separate the 8-channel podlet groups into individual channels (each includes two 8 channel leadsets, one 1-Channel leadset, 20 SMT KlipChip grabber tips).

Logic Analyzer “N” Module Options

(Base configuration is 64 K depth at 100 MHz state)

Opt. 1S – Increase to 256 K depth at 100 MHz state.

Opt. 2S – Increase to 1 M depth at 100 MHz state.

Opt. 3S – Increase to 4 M depth at 100 MHz state.

Opt. 4S – Increase to 64 K depth at 200 MHz state.

Opt. 5S – Increase to 256 K depth at 200 MHz state.

Opt. 6S – Increase to 1 M depth at 200 MHz state.

Opt. 7S – Increase to 4 M depth at 200 MHz state.

Logic Analyzer “P” Module Options

(Base configuration is 16 M depth at 100 MHz state)

Opt. 1S – Increase to 16 M depth at 200 MHz state.

Logic Analyzer “Q” Module Options

(Base configuration is 64 M depth at 100 MHz state)

Opt. 1S – Increase to 64 M depth at 200 MHz state.

TLA700 Series Module Upgrades

You can increase the memory depth and state speed of most existing TLA700 Series logic analyzer modules. You can also install a TLA7Nx/Px/Qx logic analyzer module into an existing TLA714/715/720/721/7XM mainframe. Please refer to the TLA Family Upgrade Guide for further details.

Logic Analyzer Probe Selection Guidelines

For the TLA7Nx/Px/Qx logic analyzer modules, you have the choice of three probe options.

Tektronix Logic Analyzers

▶ TLA7Nx/Px/Qx Logic Analyzer Modules

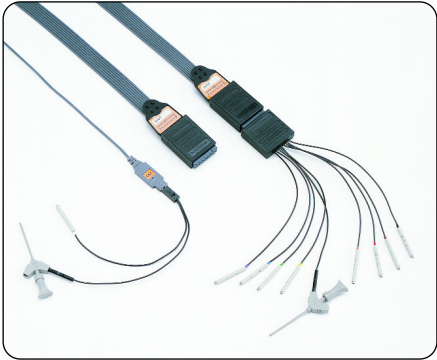
▶ Quantity of Probes Per Option

Option	TLA7N1	TLA7N2	TLA7N3	TLA7N4	TLA7P2	TLA7P4	TLA7Q2	TLA7Q4
1P Add P6418 Probes	2	4	6	8	4	8	4	8
2P Add P6434 Probes	1	2	3	4	2	4	2	4
3P Add P6417 Probes	2	4	6	8	4	8	4	8

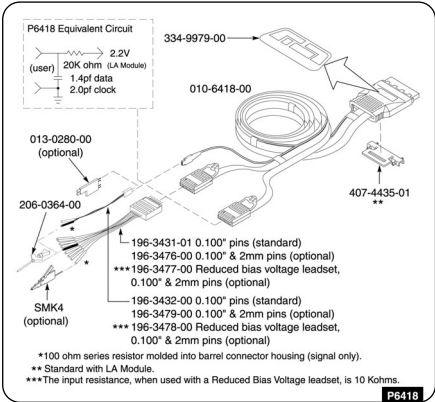
Logic Analyzer Module
Probes and Accessories

P6418 (TLA7Nx/Px/Qx Opt. 1P) – The P6418 is a 17-Channel general-purpose probe with leadsets and grabber tips for use with: 1) probing individual test points within your target system, either directly or with a test clip, or 2) direct connection to legacy TLA family processor/bus support probe adapters with 8-Channel probe connectors. The P6418 works with a wide-range of industry-standard probing accessories for flexible attachment to your target system. This probe is recommended for most general-purpose applications.

17-Channel general-purpose probe and accessories for TLA7Lx/7Mx, TLA7Nx/7Px/7Qx Logic Analyzer Modules – Order P6418.



▶ **P6418.**



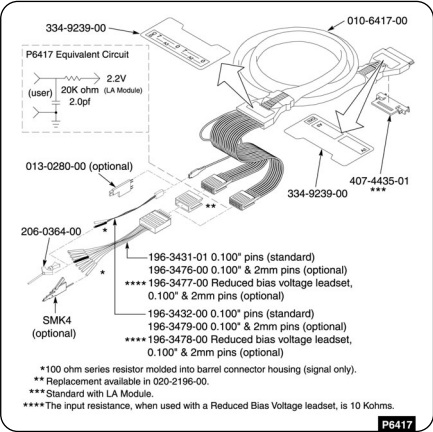
▶ **P6418.**

Part Number	Description
010-6418-00	17-Channel probe
334-9979-00	1 sheet of probe labels (not installed)
196-3431-01	1 each – 8-Channel leadset (barrel connectors support 0.100" spacing)
196-3432-00	1 each – 1-Channel leadset (barrel connectors support 0.100" spacing)
196-3477-00	1 each – 8-Channel reduced bias voltage leadset (barrel connectors support 0.100" spacing)
196-3478-00	1 each – 1-Channel reduced bias voltage leadset (barrel connectors support 0.100" spacing)
SMG50	20 each – SMT KlipChip™ grabber tips
013-0280-00	(optional) one-to-two adapter
SMK4	(optional) micro KlipChip grabber tip adapter, 4 each
071-0567-00	P6417/P6418 Instruction Manual

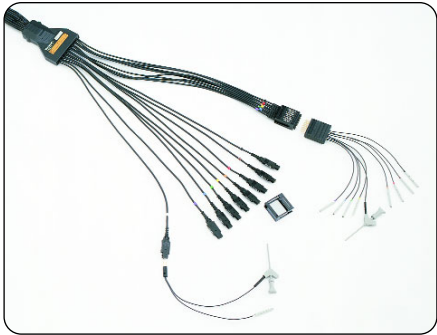
P6418 Probe Cable Length – 1.9 m (6.25 ft.).

P6417 (TLA7Nx/Px/Qx Opt. 3P) – The P6417 is a 17-Channel general-purpose probe that is similar to the P6418 with the additional capability of allowing you to separate the 8-Channel podlet groups into individual channels for both maximum electrical performance and maximum distance between adjacent channels. This probe is recommended for those general-purpose applications that require maximum flexibility.

17-Channel general-purpose probe and accessories for TLA7Lx/7Mx, TLA7Nx/7Px/7Qx Logic Analyzer Modules – Order P6417.



▶ **P6417.**



▶ **P6417.**

Part Number	Description
010-6417-00	17-Channel probe
N/A	2 each – 8-Channel podlet holders (installed)
N/A	1 Set of 17 podlet color coding bands (installed)
334-9239-00	1 sheet of probe labels (not installed)
196-3431-01	1 each – 8-Channel leadset (barrel connectors support 0.100" spacing)
196-3432-00	1 each – 1-Channel leadset (barrel connectors support 0.100" spacing)
196-3477-00	1 each – 8-Channel reduced bias voltage leadset (barrel connectors support 0.100" spacing)
196-3478-00	1 each – 1-Channel reduced bias voltage leadset (barrel connectors support 0.100" spacing)
SMG50	20 each – SMT KlipChip™ grabber tips
013-0280-00	(optional) one-to-two adapter
SMK4	(optional) micro KlipChip grabber tip adapter, 4 each
071-0567-00	P6417/P6418 Instruction Manual

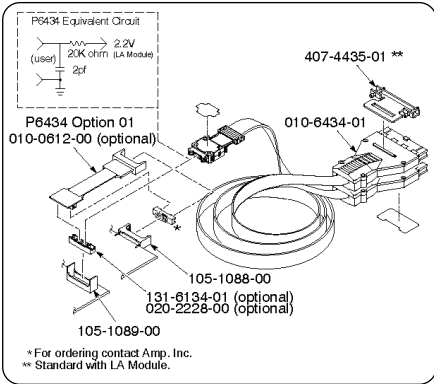
P6417 Probe Cable Length – 1.8 m (6 ft.).

Tektronix Logic Analyzers

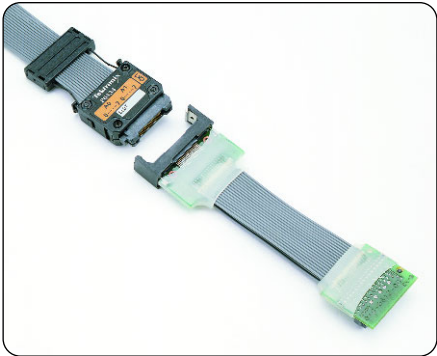
▶ TLA7Nx/Px/Qx Logic Analyzer Modules

P6434 (TLA7Nx/Px/Qx Option 2P) – The P6434 is a lightweight probe with quick connect/disconnect and a positive latching mechanism to ensure a secure, reliable connection. It is for use with: 1) applications where you have designed in the AMP Mictor high-density connectors into your target system, or 2) direct connection to newer TLA family processor/bus support probe adapters with AMP Mictor 34-Channel probe connectors. An optional low-profile adapter for low-clearance applications is also available. This probe is recommended for all high-density applications.

34-Channel High-density Probe and Accessories for TLA7Lx/Mx, TLA7Nx/Px/Qx Logic Analyzer Modules – Order P6434.



▶ P6434.



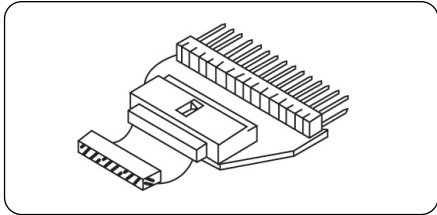
▶ P6434.

Part Number	Description
010-6434-00	34-Channel probe
N/A	1 sheet of probe labels (not installed)
105-1088-00	1 latch housing assembly, edge-mount
105-1089-00	1 latch housing assembly, vertical
070-9793-02	P6434 Instruction Manual
131-6134-01	(optional) 1 each – AMP mictor connector, surface-mount
020-2228-00	(optional) 21 each – AMP mictor connector, surface-mount

34-Channel Low-profile adapter for P6434 – Order P6434 Option 01.

Part Number	Description
010-0612-00	(optional) low-profile leadset for P6434

P6434 Probe Cable Length – 1.5 m (5 ft.).



▶ UPIK3M.

P6417 to 3M Type 3592, 2x10, 0.1 in. Adapter – Order UPIK3M (5 ea.).

Order 671-2508-00 (1 ea.).

34-Channel Probe Interface Kit w/ Barrel Connectors – Order 020-2199-00.

34-Channel Probe Interface Kit w/ mini-PV Connectors – Order 020-3000-00.

Differential-to-single-ended Converters

Each podlet converts 8 input differential pairs to a single-ended output for use with the TLA Logic Analyzer. They draw their power from separate wires connected to the system under test. The units are shipped without any input termination connected and a supply of 100 Ω termination resistors for use and installation by the user, if desired. The units are shipped without input leadsets. Leadsets are also available.

TLA Family Service Options

Opt. IN – Product installation service (on-site configuration and user familiarization; excluding network integration).

Opt. R3 – Extends depot repair warranty service period to three years.

Opt. R5 – Extends depot repair warranty service period to five years.

Opt. S1 – Uplifts standard one-year warranty service of mainframe and installed modules to on-site service.

Opt. S3 – Uplifts Opt. C3 and/or R3 of mainframe and installed modules to on-site service (must be ordered with Opt. C3 and/or R3).

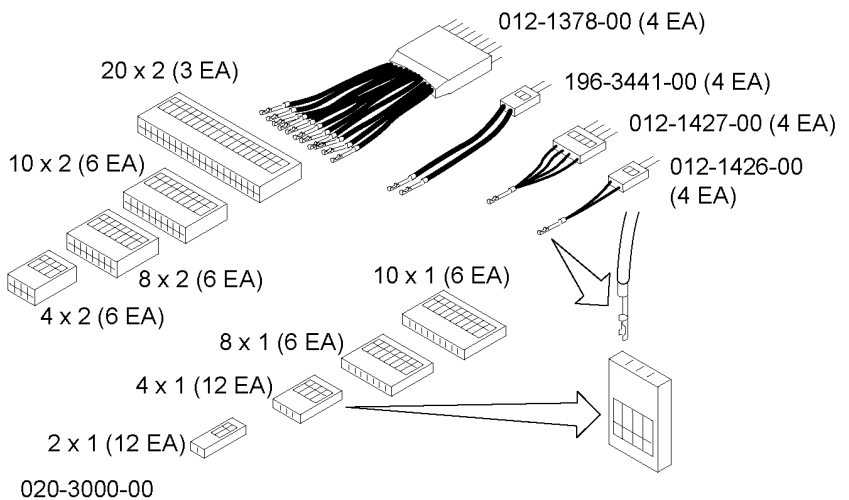
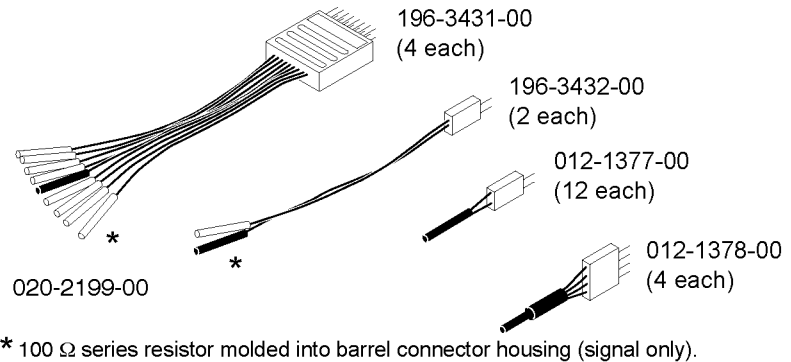
Opt. C3 – Three years of calibration service (includes initial calibration and two annual calibrations).

Opt. C5 – Three years of calibration service (includes initial calibration and four annual calibrations).

Opt. D1 – Add calibration test data report.

Opt. D3 – Provides test data for each calibration (must be ordered with Opt. C3).

Opt. D5 – Provides test data for each calibration (must be ordered with Opt. C5).



▶ TLA Family Service Options

	TLA6XX	TLA715/721	TLA7XM	TLA7Axx	TLA7NX/PX/QX	TLA7PG2	TLA7DX/EX
Opt. IN		X	X	X	X	X	X
Opt. R3	X	X	X	X	X	X	X
Opt. R5	X	X	X	X	X	X	X
Opt. S1		X	X				
Opt. S3		X	X				
Opt. C3	X	X		X	X	X	X
Opt. C5	X	X		X	X	X	X
Opt. D1	X	X		X	X	X	X
Opt. D3	X	X		X	X	X	X
Opt. D5	X	X		X	X	X	X

Tektronix Logic Analyzers

► TLA7Nx/Px/Qx Logic Analyzer Modules



► Differential-to-single-ended converter pods.

Differential ECL/PECL to single-ended ECL converter pod

Each channel is converted via an ON Semiconductor MC10E416 buffer which will support speeds as high as 800 MHz. The inputs have provisions for differential and/or parallel termination. The input power is provided via two leads that are connected to a lower voltage and a higher voltage, each DC-isolated from the output, allowing operation in both ECL and PECL systems.

Differential LVDS/TTL to single-ended TTL converter pod

Each channel is converted via a National Semiconductor DS90LV032A receiver supporting data rates in excess of 400 Mbps (200 MHz). The inputs have provisions for differential terminations and have resistor-diode input protection from over voltage.

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02/02 HB/XBS

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