

# Logic Analyzers

## TLA5000B Series Data Sheet



### Features & Benefits

- 500 ps (2 GHz)/32 Mb timing record length to capture intermittent events over a wide time window
- 125 ps resolution MagniVu™ acquisition simultaneous with timing or state acquisition to find elusive timing problems quickly, without double probing
- Glitch and setup/hold violation triggering and display to find and display elusive hardware problems
- 235 MHz state acquisition provides analysis of high-speed synchronous digital circuits
- iView™ time-correlated digital-analog view to clearly see how analog anomalies are affecting your digital signals
- 34/68/102/136 channel configurations offer flexible solutions to fit any budget
- Microsoft Windows XP Professional PC controller provides familiar user interface with network connectivity
- Remotely control and monitor the TLA over the network using either hosted mode or the built-in Windows XP remote desktop

### Applications

- Digital hardware verification and debug
- Monitoring and measurement of digital hardware performance
- Single microprocessor or bus debug

### TLA5000B Series Logic Analyzers Combine Debug Power with Simplicity and Affordability

The affordable TLA5000B Series logic analyzers make high-speed timing resolution, fast state acquisition, long record length, and sophisticated triggering available to any digital designer who needs to identify initialization failures, operation crashes, and intermittent operation. For first-time as well as experienced logic analyzer users, the TLA5000B Series is ideal for single-bus timing and state analysis. An intuitive user interface, familiar Windows-based desktop, and OpenChoice® networking and analysis features make the TLA5000B Series logic analyzers easy to network into your design environment.

500 ps timing resolution and 32 Mb record length with simultaneous 125 ps MagniVu timing resolution within each acquisition means you can measure digital signal timing on increasingly faster signals with confidence. With MagniVu timing resolution, find difficult problems such as digital logic errors, glitches, setup/hold violations, and crosstalk quickly. Use setup/hold violation triggering and display to validate setup/hold performance of digital devices.

Today, most designs can have both digital and analog anomalies. With iView™ time-correlated digital-analog view, you'll clearly see how analog anomalies are affecting your digital signals – right on your logic analyzer display.

## Characteristics

### General

Characteristic	Description
Number of Channels	(all channels are acquired including clocks)
TLA5201B	34 channels (2 are clock channels)
TLA5202B	68 channels (4 are clock channels)
TLA5203B	102 channels (4 are clock and 2 are qualifier channels)
TLA5204B	136 channels (4 are clock and 4 are qualifier channels)
Time Stamp	51 bits at 125 ps resolution (3.25 days duration)
Clocking/Acquisition Modes	Asynchronous and Synchronous. 125 ps (8 GHz) MagniVu™ high-speed timing is available simultaneous with all modes

### Input Characteristics (with P64xx probes)

Characteristic	Description
Capacitive Loading	
(P6419, P6450)	<0.7 pF typical data/clock
(P6410, P6434)	2 pF typical data/clock
Threshold Selection Range	From -2.0 V to +4.5 V in 5 mV increments. Threshold presets include TTL (1.5 V), CMOS (1.65 V), ECL (-1.3 V), PECL (3.7 V), LVPECL (2.0 V), LVCMOS 1.5 V (0.75 V), LVCMOS 1.8 V (0.9 V), LVCMOS 2.5 V (1.25 V), LVCMOS 3.3 V (1.65 V), LVDS (0 V), and user defined
Threshold Selection Channel Granularity	Separate selection for each of the clock/qualifier channels and one per group of 16 data channels
Threshold Accuracy (including probe)	±(100 mV)
Input Voltage Range	
Operating	-2.5 V to 5.0 V
Nondestructive	±15 V
Minimum Input Signal Swing	
P6410, P6419, P6450	±250 mV
P6434	±300 mV
Input Signal Minimum Slew Rate	200 mV/ns typical

### State Acquisition Characteristics

Characteristic	Description
Maximum State Clock Rate	235 MHz
Maximum State Data Rate	470 Mb/s
State Record Length with Time Stamps (half/full channels)	4/2 Mb, 16/8 Mb, 64/32 Mb
Setup-and-Hold Time Selection Range	16 ns range that may be shifted towards the setup region by 0 ns [+8, -8] ns, 4 ns [+12, -4] ns, or 8 ns [+16, 0] ns
Setup-and-Hold Window	All Channels: 1.5 ns typical
Minimum Clock Pulse Width	
P6434	1.5 ns
P6410, P6419, P6450	1.25 ns
Demux Channel Selection	Channels can be demultiplexed to other channels through user interface with 8-channel granularity

### Timing Acquisition Characteristics

Characteristic	Description
MagniVu™ Timing Resolution	125 ps (8 GHz). Storage rate adjustable to 250 ps, 500 ps, 1 ns, and 2 ns
MagniVu Timing Record Length	16 Kb per channel, with adjustable trigger position
Timing Resolution (quarter/half/full channels)	500 ps/1 ns/2 ns to 50 ms
Timing Record Length (quarter/half/full channels with time stamps and with or without transitional storage)	8/4/2 Mb, 32/16/8 Mb, 128/64/32 Mb per channel
Timing Record Length with Glitch Storage Enabled	Half of default main record length
Channel-to-channel Skew	1 ns (900 ps typical)
Minimum Recognizable Pulse/Glitch Width (single channel)	
P6410, P6419, P6450	1 ns
P6434	1.25 ns
Minimum Detectable Setup/Hold Violation	250 ps
Minimum Recognizable Multichannel Trigger Event	Sample period + channel-to-channel skew

### Trigger Characteristics

Characteristic	Description
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 Transition Recognizers	16
Number of Range Recognizers	4
Number of Counter/Timers	2
Trigger Event Types	Word, group, channel, transition, range, anything, counter value, timer value, signal, glitch, setup-and-hold violation, snapshot
Trigger Action Types	Trigger main, trigger MagniVu™, store, don't store, start store, stop store, increment counter, decrement counter, reset counter, start timer, stop timer, reset timer, snapshot current sample, goto state, set/clear signal, do nothing
Trigger Sequence Rate	DC to 500 MHz (2 ns)
Counter/Timer Range	51 bits each (>50 days at 2 ns)
Counter Rate	DC to 500 MHz (2 ns)
Timer Clock Rate	500 MHz (2 ns)
Counter/Timer Latency	2 ns
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 7.5 ns after clock edge in 125 ps increments
Setup-and-Hold Violation Recognizer Hold Time Range	From 7.5 ns before to 8 ns after clock edge in 125 ps increments
Trigger Position	Any data sample
MagniVu™ Trigger Position	MagniVu position can be set from 0% to 60% centered around the MagniVu trigger
Storage Control (data qualification)	Global (conditional), by state (start/stop), block, by trigger action, or transitional. Force main prefill selection available

### iView™ (Integrated View) Capability

Characteristic	Description
TLA Mainframe Configuration Requirements	<p>                     GPIB-iView (Opt. 1C) requires TLA Application Software V5.0 or greater                      USB-iView (Opt. 2C) requires TLA Application Software V5.8 or greater                 </p>
Number of Oscilloscopes that can be Connected to a TLA System	1
External Oscilloscopes Supported	For a complete list of currently supported oscilloscopes that are supported, please visit our website <a href="http://www.tektronix.com/iview">http://www.tektronix.com/iview</a>
TLA Connections	USB, Trigger In, Trigger Out, Clock Out
Oscilloscope Connections	
GPIB-iView (Opt. 1C)	GPIB, Trigger In, Trigger Out, Clock In (when available)
USB-iView (Opt. 2C)	USB Device Port, Trigger In, Trigger Out
Setup	iView external oscilloscope wizard automates setup
Data Correlation	After oscilloscope acquisition is complete, data is automatically transferred to the TLA and time correlated with the TLA acquisition data
Deskew	Oscilloscope and TLA data is automatically deskewed and time correlated when using the iView external oscilloscope cable
GPIB-iView External Oscilloscope Cable Length	2 m (6.6 ft.)
USB-iView External Oscilloscope Cable Length	1.8 m (6 ft.)

### PC Characteristics

Characteristic	Description
Operating System	Microsoft Windows XP Professional with Multilingual User Interface Pack
Processor	Intel Celeron 2.0 GHz
Chipset	Intel 865G
DRAM	512 MB SDRAM
Sound	16 bit I/O and Mic In port
Hard Drive	≥80 GB
Optical Drive	Internal 24/10/24 CD-RW

### Integral Controls

Characteristic	Description
Front-panel Display	
Size	10.4 in. (26.4 cm) diagonal
Type	Active-matrix color TFT LCD with backlight
Resolution	1024×768
Colors	256k
Simultaneous Display Capability	The front-panel and secondary displays can be operated simultaneously using the same resolution. The secondary external display can be used simultaneously using an independent resolution
Front-panel Controls	Special function knobs for instrument control and mini-QWERTY keypad

**External Peripheral Interfaces**

Characteristic	Description
External Display Port Type	Two female DB15 SVGA
External Display Resolution	Up to 1600×1200 noninterlaced at 16.8M colors
LAN Port Type	10/100Base-T, RJ-45
External Keyboard Port Type	PS2 mini-DIN
External Mouse Port Type	PS2 mini-DIN
Parallel Interface Port Type	Female DB25
Parallel Interface Modes	Centronics mode, EPP (Extended Parallel Port), ECP (Microsoft high-speed mode)
Serial Interface Port Type	Male DB9
Audio Out Port Type	Stereo minijack
Mic In Port Type	Minijack
USB Port	Four USB 2.0

**Symbolic Support**

Characteristic	Description
Number of Symbols/Ranges	Unlimited (limited only by amount of virtual memory available on TLA)
Object File Formats Supported	IEEE695, OMF 51, OMF 86, OMF 166, OMF 286, OMF 386, COFF, Elf/Dwarf 1 and 2, Elf/Stabs, TSF (TSF is a generic ASCII file format documented in the TLA user manual). If a format is not listed, please contact your local Tektronix representative

**External Instrumentation Interfaces**

Characteristic	Description
System Trigger Output	Asserted whenever a system trigger occurs (TTL-compatible output, back-terminated into 50 Ω). BNC type connector
System Trigger Input	Forces a system trigger (triggers all modules) when asserted (TTL-compatible, edge-sensitive, falling-edge latched). BNC type connector
External Signal Output	Can be used to drive external circuitry from a module's trigger mechanism (TTL-compatible output, back-terminated into 50 Ω). BNC type connector
External Signal Input	Can be used to provide an external signal to arm or trigger any or all modules (TTL-compatible, level-sensitive). BNC type connector

**Power**

Characteristic	Description
Voltage Range/Frequency	90-240 V AC at 47-63 Hz
Input Current	5 A maximum at 90 V AC
Power Consumption	300 W maximum

**Physical Characteristics**

<b>TLA5000B</b>			
Dimensions	mm		in.
Height	285		11.2
Width	438		17.5
Depth	288		11.35
Weight	kg		lb.
Net (w/o probes)	12		26
Shipping (typical)	18.5		41

**Environmental**

Characteristic	Description
Temperature	
Operating	+5 °C to +50 °C
Nonoperating	-20 °C to +60 °C
Humidity	
Operating	20% to 80% relative humidity (29 °C maximum wet bulb temperature)
Nonoperating	8% to 80% (29 °C maximum wet bulb temperature)
Altitude	
Operating	-1,000 ft. to 10,000 ft. (-305 m to 3,050 m)
Safety	UL3111-1, CSA1010.1, EN61010-1, IEC61010-1

## Ordering Information

### TLA5201B

34 Channel, 2 GHz Timing with 125 ps MagniVu™ Acquisition, 235 MHz State, 2 Mb Logic Analyzer.

### TLA5202B

68 Channel, 2 GHz Timing with 125 ps MagniVu™ Acquisition, 235 MHz State, 2 Mb Logic Analyzer.

### TLA5203B

102 Channel, 2 GHz Timing with 125 ps MagniVu™ Acquisition, 235 MHz State, 2 Mb Logic Analyzer.

### TLA5204B

136 Channel, 2 GHz Timing with 125 ps MagniVu™ Acquisition, 235 MHz State, 2 Mb Logic Analyzer.

**All Include:** Optical Wheel Mouse, USB (119-7054-xx), USB Mini Keyboard (119-7275-xx), Front Panel Cover (200-4651-xx), Probe Retainer Bracket (407-4435-xx), TLA Application Software CD (063-3881-xx), TLA Documentation CD (063-3671-xx), TLA5000B Quick Installation Reference (071-1343-xx), Certificate of Traceable Calibration, Power Cord.

**Note:** Please specify power cord, language, and service options when ordering.

Probes are sold separately.

## Instrument Options

Option	Description
1C	GPIO-iView™ external oscilloscope cable kit (012-1614-xx) (requires TLA Application SW V5.0 or greater)
2C	USB-iView external oscilloscope cable kit (requires TLA Application SW V5.8 or greater)
PO	Accessory pouch for TLA5000B
8S	Increase to 8 Mb base record length per channel
9S	Increase to 32 Mb base record length per channel

## Recommended Accessories

Accessory	Description
Logic Analyzer Cart	
LACART	2-shelf Cart
K4000	3-shelf Cart
407-4996-xx	Logic Analyzer Cart Mounting Bracket Kit
016-1887-xx	TLA5000B Rackmount Kit
016-1937-xx	TLA5000B Wheeled Transport Case
071-1305-xx	TLA5000B Service Manual

## Logic Analyzer Probe Selection Guidelines

There is a flexible choice of logic analyzer probes available for use with TLA5000B logic analyzers. Please see the logic analyzer probe data sheets for more information.

## Service Options

Option	Description
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
D1	Calibration Data Report
D3	Calibration Data Report 3 Years (with Option C3)
D5	Calibration Data Report 5 Years (with Option C5)
G3	Complete Care 3 Years (includes loaner, scheduled calibration and more)
G5	Complete Care 5 Years (includes loaner, scheduled calibration and more)
R3	Repair Service 3 Years
R5	Repair Service 5 Years

## Power Cord Options

Option	Description
A0	North America power
A1	Universal Euro power
A2	United Kingdom power
A3	Australia power
A4	240 V, North America power
A5	Switzerland power
A6	Japan power
A10	China power
A11	India power
A12	Brazil power
A99	No power cord or AC adapter

## Language Options

Option	Description
L0	English manuals
L5	Japanese manuals
L10	Russian manuals
L99	No manuals



Product(s) are manufactured in ISO registered facilities.





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