

Logic Analyzer

GLA-1016/1032/1132

USER MANUAL

GW INSTEK PART NO. 82LA-1132oMo



ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

EC Declaration of Conformity

We

GOOD WILL INSTRUMENT CO., LTD.

(1) No.7-1, Jhongsing Rd., Tucheng City, Taipei County, Taiwan

(2) No. 69, Lu San Road, Suzhou City (Xin Qu), Jiangsu Sheng, China

declare, that the below mentioned product

Type of Product: Logic Analyzer

GLA-1016, GLA-1032, GLA-1132

are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (89/336/EEC) and the amendments in the Council Directive 92/31/EEC, 93/68/EEC.

For the evaluation regarding the Electromagnetic Compatibility, the following standards were applied:

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EN 55022: 1998 + A1:2000 +A2:2003		EN 55024: 1998+A1:2001+A2:2003	
Conducted Emission Class A Radiated Emission		Electrostatic Discharge IEC 61000-4-2: A2:2001	
		Radiated Immunity IEC 61000-4-3: 2002 + A1:2002	
		Electrical Fast Transients IEC 61000-4-4: 2004 (Not Applied)	
		Surge Immunity IEC 61000-4-5: :2001(Not Applied)	
		Conducted Susceptibility IEC 61000-4-6: 2003 + A1:2004 (Not Applied)	
		Power Frequency Magnetic Field IEC 61000-4-8: 2001	
		Voltage Dip/ Interruption IEC 61000-4-11: 2004 (Not Applied)	

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Safety Instructions

This chapter contains important safety instructions that must be followed when operating GLA and when keeping it in storage. Read the following before any operation to insure safety and to keep the best condition for GLA.

Symbols and Guidelines

Symbol	Caution symbol identifies conditions or practices that could result in damage to GLA or to other properties.
 CAUTION	
General Guideline	• Do not place any heavy object on GLA. • Avoid severe impacts or rough handling that leads to damaging GLA. • Do not discharge static electricity to GLA. • Do not disassemble GLA unless you are qualified as service personnel.
 CAUTION	
Cleaning GLA	• Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid into GLA. • Do not use chemicals or cleaners containing harsh materials such as benzene, toluene, xylene, and acetone.
Operation Environment	Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below) • Relative Humidity: < 80% • Altitude: < 2000m • Temperature: 0°C to 50°C
 WARNING	
Storage Environment	Location: Indoor • Relative Humidity: < 80% • Temperature: -40°C to 80°C

GLA Overview

This chapter describes GLA series features and appearances in a nutshell. Use the Package Contents section to check if there is any missing component.

Main features	Series lineup7
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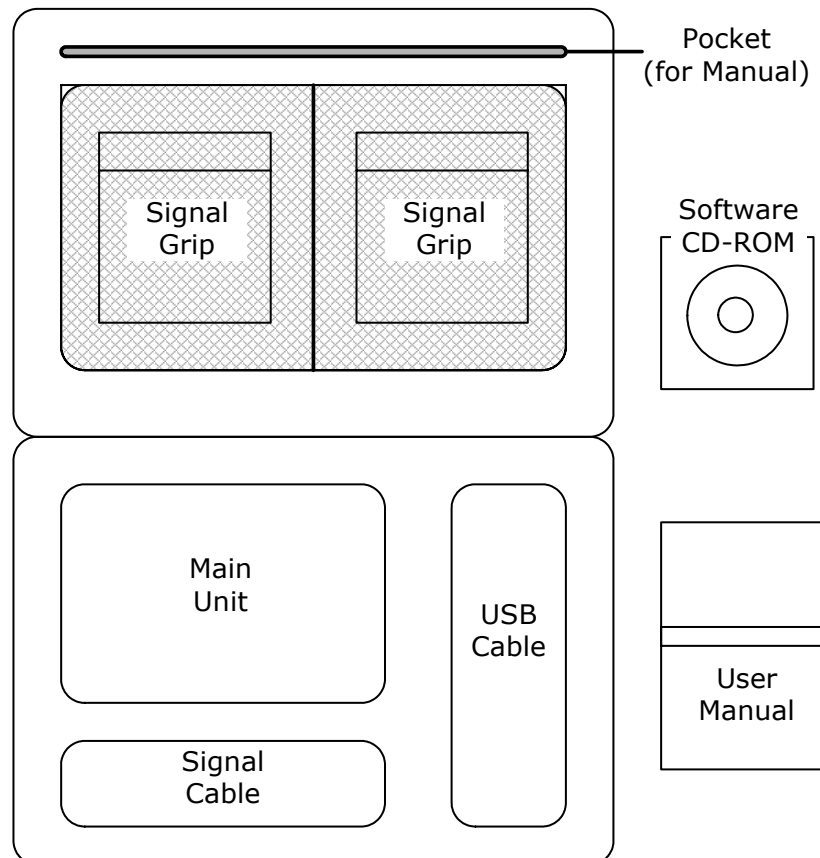
Main Features

Series lineup	• GLA-1016: 16 channels, 256Kbit/channel • GLA-1032: 32 channels, 128Kbit/channel • GLA-1132: 32 channels, 1Mbit/channel
Characteristics	• Internal clock range: 100Hz ~ 200MHz • External clock range: 0.001Hz ~ 100MHz • Rich trigger functionalities: voltage level, count, page, position, delay time and clock, edge and level configuration • Memory utilization: max. x255 ratio data compression • Signal characteristic filtering: Enable function • Various signal display mode: waveform, listing, time, frequency, and address • I²C, RS-232C waveform analyzer • Waveform statistics function • Compact, lightweight profile • PC operation with GUI environment • Fast communication: USB 2.0, 1.1 compatible • USB bus powered • Various file export: operation setting, waveform data, display image

Package Contents

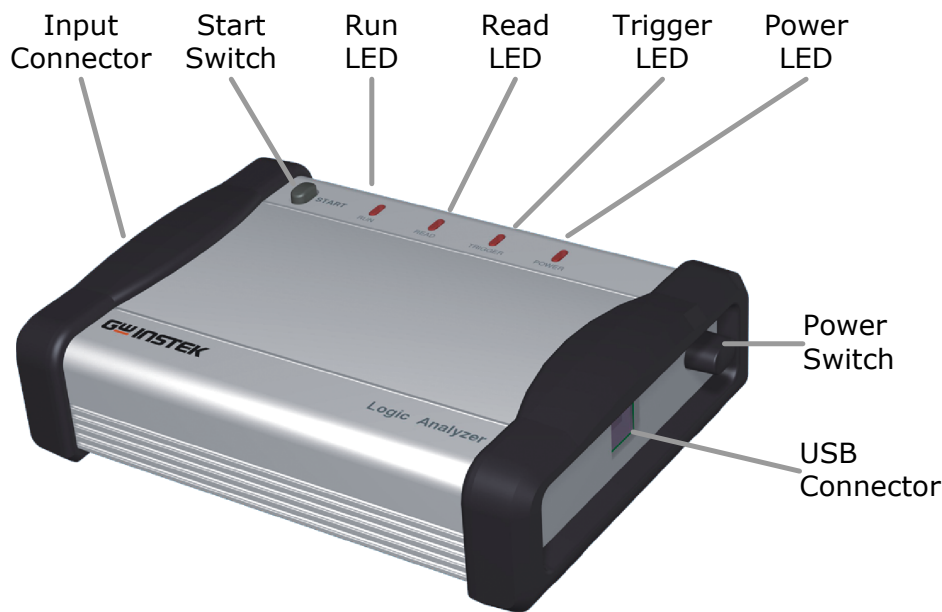
Check the contents before using GLA series. Contact your local dealer in case there is a missing item.

Carrying case
contents



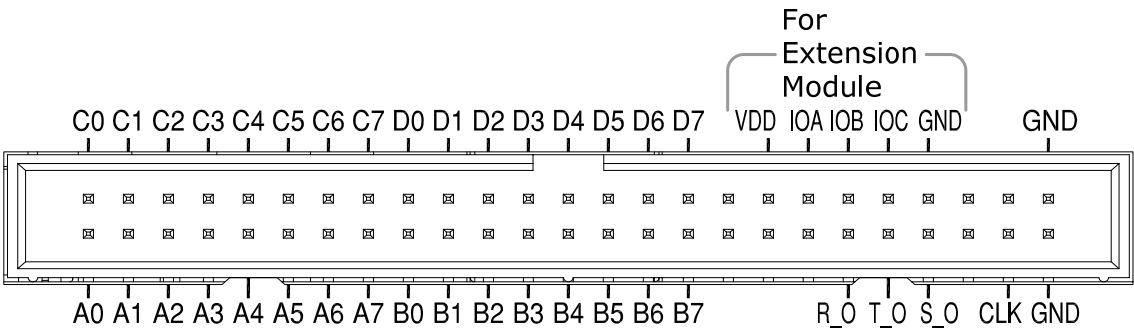
GLA-1016	• Signal Cable: 8pin*2, 2pin*1, 1pin*1, 250mm • Signal Grip: 20pcs
GLA-1032	• Signal Cable: 16pin*1, 8pin*2, 2pin*1, 1pin*1, 250mm • Signal Grip: 36pcs
GLA-1132	• Signal Cable: 16pin*1, 8pin*2, 2pin*1, 1pin*1, 250mm • Signal Grip: 36pcs

Panel Overview



USB Connector	For power input (USB bus) and communication between the PC. USB 1.1/2.0 compatible.
	USB2.0 is strongly recommended for smooth display update. Make sure the cable is also compatible with 2.0 high speed (use the attached cable).
Power Switch	Switch On  : LED On (red)
Power LED	Switch Off  : LED Off
Trigger LED	Turns On when the trigger condition is met. For details, see page61 (LED details), page47 (trigger in general).
Read LED	Turns On when GLA transmit waveform data to PC. For details, see page61.
Run LED	Turns On when GLA is waiting for trigger condition. For details, see page61.
Start Switch	Triggers signal capturing. This is the same functionality as the Single Run  . For Run/Stop details, see page74.

Input Connector



A0~D7 Signal input terminal. C0 ~ C7, D0 ~ D7 are not applicable to GLA-1016.

VDD, IOA/B/C, +3.3V power, IO port, GND terminal for extension module.
GND

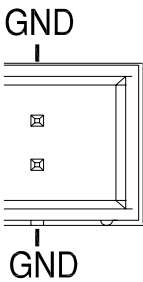
 Do not use these connectors other than extension module usage purpose.

R_O, T_O, S_O Output signals for monitoring data capturing and trigger timing. Read output (R_O) indicates waveform data is transferred to PC, Trigger output (T_O) indicates trigger condition has occurred, and Start output (S_O) indicates GLA started waiting for trigger condition. For details, see page61.

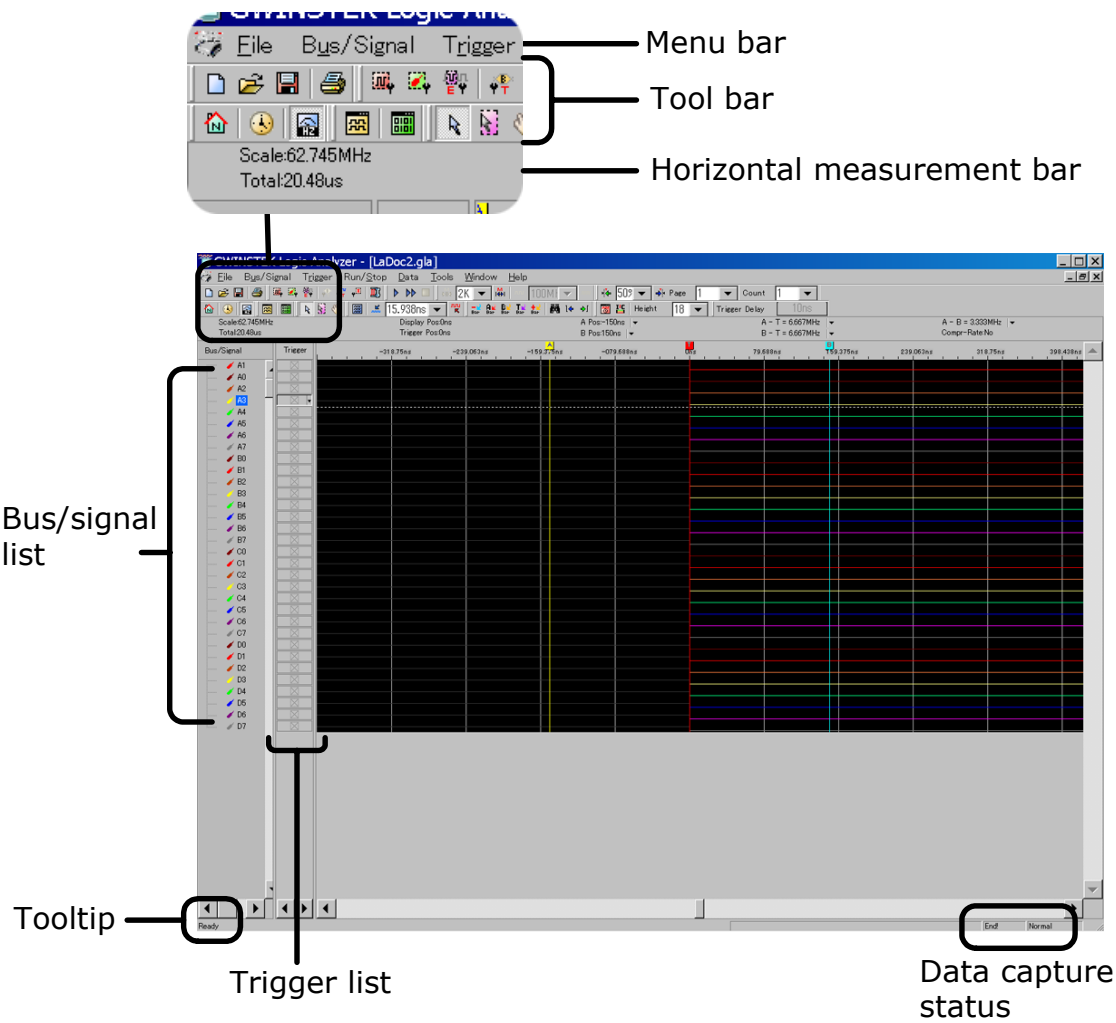
CLK External (synchronous) clock signal input, 0.001Hz ~ 100MHz. For details, see page41.

GND Ground terminal.

 We strongly recommend connecting both two Ground terminals to ensure stable data capturing.

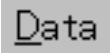
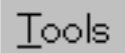


Display Overview



Menu bar

Shortcut	Display	Description
Alt + f	File	File operation (page29).
Alt + u	Bus/Signal	Bus/Signal configuration (page39).
Alt + r	Trigger	Trigger configuration (page47).
Alt + s	Run/Stop	Data capturing (page74).

Alt + d		Data operation (page76) and display setup (page62).
Alt + t		Display setup (page62), Shortcut key setup (page100), I ² C analysis (page90), and RS-232C analysis (page94).
Alt + w		Display configuration (page67) and organizing multiple files (page37).
Alt + h		Help file (page103) and system information (page102).

Tool bar

Toolbar collects icons for major operations, sorted in groups.

To enable/disable each group, select **T**ools→Customize... from the menu and go to the Toolbar tab. For details, see page63.

Standard group



Page30

Create a new project file



Page31

Open a project file



Page32

Save the project file



Page36

Print out the display

Trigger group



Page40

Configure sampling rate



Page43

Configure signal/bus



Page57

Setup enable function



Page51

Setup bus trigger properties



Page48

Setup signal trigger properties



Page53

Setup general trigger properties



Page42 Enable/disable data compression

Run/Stop group



Page74

Single run



Page74

Continuous run

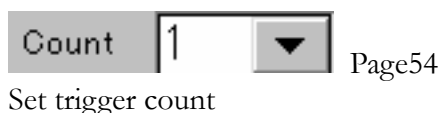
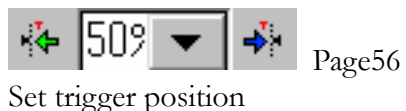


Page75 Stop running

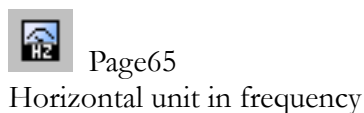
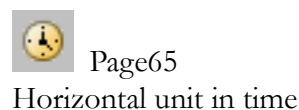
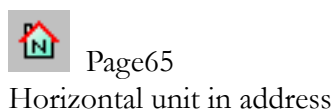
Sampling group



Trigger content set group



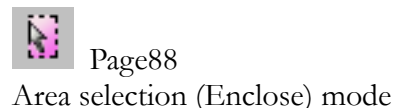
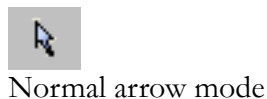
Display mode group



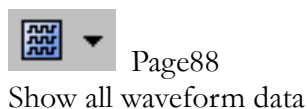
Windows group



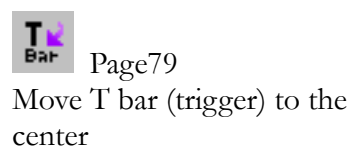
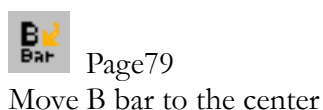
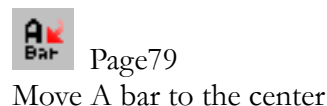
Mouse pattern group



Zoom group



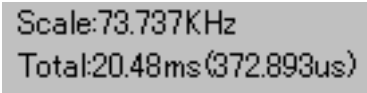
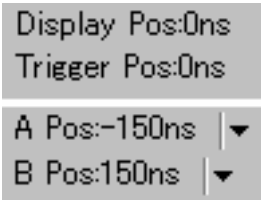
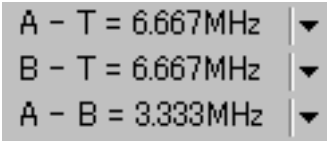
Data group



	 Page78 Add data bar	 Page83 Search data
	 Page81 Go to the previous edge	 Page81 Go to the next edge
Show time/height group	 Page69 Show waveform timing	 Page90 Analyze I²C waveform
	 Page94 Analyze RS-232C waveform	 Page66 Change the waveform bar height
Trigger delay group	 Page56 Set and show the amount of trigger delay	

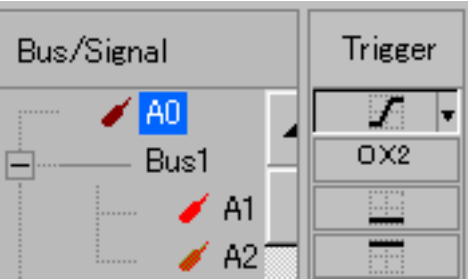
Horizontal measurement bar

Displays the horizontal scale and measurement results of the display. For details, see page65.

Horizontal range		Scale (upper line) shows the data acquisition clock frequency. Total (lower line) shows the total length of data acquired by GLA, followed by the length covered by the analysis range bar. For analysis range details, see page89.
Position		Display Pos (position) shows the timing of the display center position. Trigger Pos (position) shows the trigger timing. For details, see page79. A/B Position shows user-defined bar timings. For details, see page79.
Time/frequency difference		Shows the distance between two bars, whether trigger or user-defined, in time, frequency, or address point. For details, see page65.

Compression	Compr-Rate:0.063	Shows the data compression ratio when the compression mode is enabled. For details, see page42.
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Bus/Signal and Trigger list



Signal and bus names are shown in colored codes, with matching trigger setting on the right side.

Bus/signal setup details→page39.

Trigger setup details→page47.

Operation Shortcuts

This is the collection of all operations available from the menu, icon, or keyboard shortcut. The “Keyboard map” on the Help menu also opens the shortcut list.

File menu

Description	Shortcut	Icon	Menu
Close GLA software.	Alt+F4	—	File→Exit
Create a new file.	Ctrl+N		File→New
Open a file.	Ctrl+O		File→Open
Close the file.	Ctrl+F4	—	File→Close
Save the file.	Ctrl+S		File→Save
Save the file in a different name.	—	—	File→Save As
Save waveform data and setting info into *.txt or *.csv file.	Ctrl+Shift+E	—	File→Export
Save the screen snapshot into *.jpg or *.bmp file.	Ctrl+C	—	File→Capture Window
Select the language.	—	—	File→Language
Prints out the screen snapshot.	Ctrl+P		File→Print
Shows the screen snapshot printout preview.	—	—	File→Print Preview
Opens the standard printer setup window.	—	—	File→Print Setup
Switch between files.	Ctrl+Tab	—	Window→1, 2, ...
Display multiple files at once.	—	—	Window→Cascade, Horizontal, Vertical

Bus/Signal menu

Description	Shortcut	Icon	Menu
Open the Sampling setup dialogue window.	—		Bus/Signal→Sampling Setup
Decrease the sampling rate.	F2	—	—
Increase the sampling rate.	F3	—	—
Open the Channel setup dialogue window.	—		Bus/Signal→Channels Setup
Group signals into bus.	Ctrl+G	—	Bus/Signal→Group into Bus
Ungroup bus into signals.	Ctrl+U	—	Bus/Signal→Ungroup from Bus

Expand the bus.	—	—	Bus/Signal→Expand
Collapse the bus.	—	—	Bus/Signal→Collapse
Automatically adjust the channel row width (only in listing mode)	—	—	Bus/Signal→Format Row→Auto Size
Move the cursor up.	Up	—	Bus/Signal→Format Row→Move Up
Move the cursor down.	Down	—	Bus/Signal→Format Row→Move Down
Hide the signal/bus.	—	—	Bus/Signal→Format Row→Hide
Show all the signal/bus.	—	—	Bus/Signal→Format Row→Show All
Set the signal/bus color.	—	—	Bus/Signal→Format Row→Color
Rename signal or bus.	—	—	Bus/Signal→Rename

Trigger menu

Description	Shortcut	Icon	Menu
Open the Bus trigger setup dialogue window.	—		Trigger→Bus
Open the Signal trigger setup dialogue window.	—		Trigger→Signal
Open the General trigger properties dialogue window.	—		Trigger→Properties
Change signal trigger condition.	Space	—	Trigger→...

Run/Stop menu

Description	Shortcut	Icon	Menu
Single run.	F5		Run/Stop→Single Run
Continuous run.	F6		Run/Stop→Repetitive Run
Stop running.	F7		Run/Stop→Stop

Data menu

Description	Shortcut	Icon	Menu
Go to the next data page.	PageDown	—	—
Go to the previous data page.	PageUp	—	—
Go to the beginning of data.	Home	—	—
Go to the end of data.	End	—	—
Move the waveform position right.	Right	—	—

Move the waveform position left.	Left	—	—
Add data bar.	Alt+A		Data→Add Bar
Delete data bar.	Alt+B		Data→Delete Bar
Move T bar to the display center.	T, Ctrl+T		Data→GoTo→GoTo Trigger
Move A bar to the display center.	A, Ctrl+A		Data→GoTo→GoTo A Bar
Move B bar to the display center.	B, Ctrl+B		Data→GoTo→GoTo B Bar
Move any bar (T, A, B, Ds, Dp, user defined bar) to the display center.	—	—	Data→GoTo→GoTo More
Move to the previous edge.	F11		Data→Before
Move to the next edge.	F12		Data→After
Move the display sideways (use the Hand pointer).	H		Data→Hand
Select the zoom area (use the Enclose pointer)	E		Data→Enclose
Use the normal pointer.	Esc		Data→Normal
Search data.	Ctrl+F		Data→Find Data Value
Zoom in.	F9		Data→Zoom In
Zoom out.	F8		Data→Zoom Out
Undo the last zoom.	Ctrl+Z		Data→Undo Last Zoom
Show all data.	F10		Data→Show All Data
Adjust the display range to analysis bar.	—		—
Select the data analysis range.	—	—	Data→Select Analytic Range
Show waveform analysis result.	—		—
Show waveform data in binary.	—	—	Data→Show As→Binary
Show waveform data in decimal.	—	—	Data→Show As→Decimal
Show waveform data in hexadecimal.	—	—	Data→Show As→Hexadecimal
Show waveform in square form.	—	—	Data→Wave Mode→Square Waveform
Show waveform in sawtooth form.	—	—	Data→Wave Mode→Sawtooth Waveform
Activate data compression.	—		—

Tools menu

Description	Shortcut	Icon	Menu
Open the display customize dialogue window.	—	—	<u>T</u> ools→Customize
Open the I ² C analysis dialogue window.	—		<u>T</u> ools→Analy IIC Wave
Open the RS-232 analysis dialogue window.	—		<u>T</u> ools→Analy UART Wave
Show the waveform timing.	—		<u>T</u> ools→Show time of waveform

Window menu

Description	Shortcut	Icon	Menu
Open the display customize dialogue window.	—	—	<u>T</u> ools→Customize
Show the waveform view.	—		<u>W</u> indow→Waveform Display
Show the listing view.	—		<u>W</u> indow→Listing Display
Show the waveform timing.	—		<u>W</u> indow→Show time of waveform
Switch between files.	Ctrl+Tab	—	<u>W</u> indow→1, 2, ...
Display multiple files at once.	—	—	<u>W</u> indow→Cascade, Horizontal, Vertical

Help menu

Description	Shortcut	Icon	Menu
Open the Help file.	F1	—	<u>H</u> elp→GWInstek Logic Analyzer
Open the keyboard shortcut list.	—	—	<u>H</u> elp→Keyboard Map
Send a bug reporting email.	—	—	<u>H</u> elp→Report a Problem
Show the software version.	—	—	<u>H</u> elp→About GWInstek Logic Analyzer

Installation

This chapter describes software installation, activation, and functionality check. Follow these instructions to properly install GLA series.

Software installation	PC requirement	21
	Setup activation	22
	License agreement	22
	User information.....	23
	Setup type	23
	Custom setup.....	24
	PC reboot	24
	Driver installation	24
	Uninstall, repair, modification.....	25
Power Up	Power Up	26
	Demonstration mode	27
Functionality check	Hardware connection	28
	Signal capturing.....	28

Software Installation

PC requirement

The readme.txt file in the CD-ROM also contains this information.

OS	Windows 98 Windows Me Windows 2000 Windows XP
CPU	Windows 98/Me: 166MHz minimum Windows 2000/XP: 300MHz minimum
RAM	Windows 98/Me/2000: 128MB minimum Windows XP: 256MB minimum
Hard disc	100MB minimum
USB	1 USB host connector, 1.1 or 2.0 compatible (2.0 strongly recommended)

Installation procedure

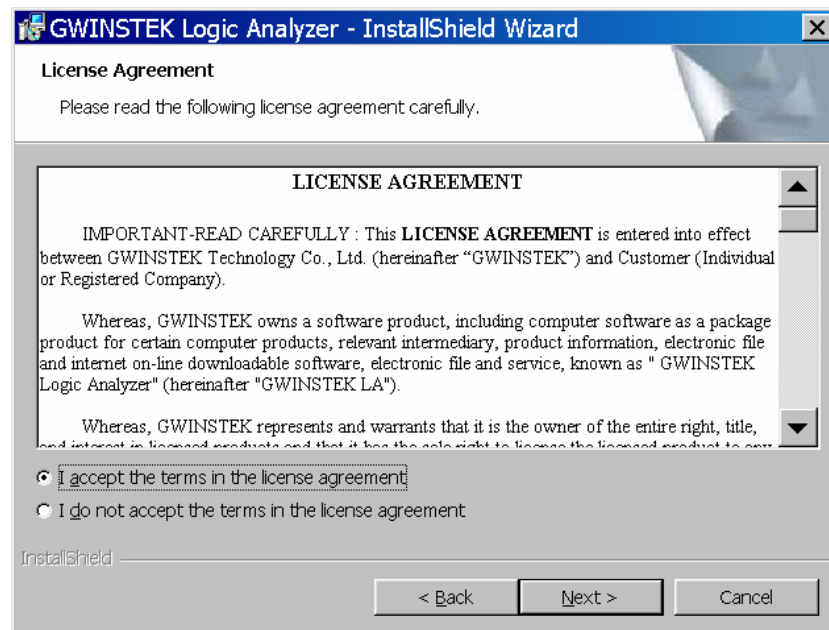
Setup activation Insert the software CD-ROM into the PC. If the below Setup screen does not appear, double-click the Setup.exe file.

Click the INSTALL button.



License agreement

Read the license term and select acept, click Next.



User information Enter your user name and organization. Set the range of user access: All users or the user currently logged in.

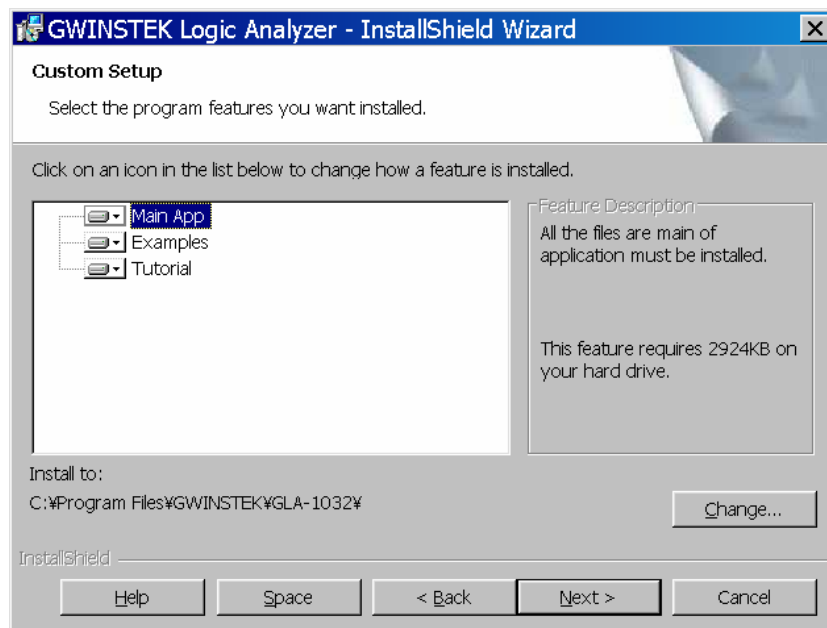
Setup type Select the setup type.

Complete setup: All features will be installed. The program directory is automatically set.

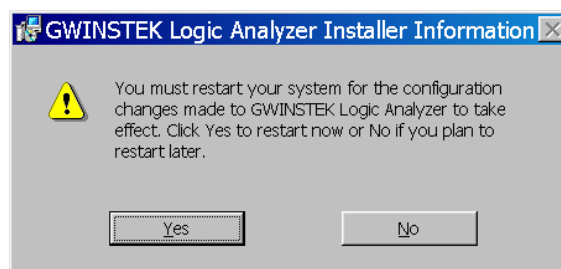
Custom setup: Installed features and program directory are set by the user. See the next page.

Custom setup

The custom setup option allows users to select the program features and directory. Installed features can be modified later (page25).

**PC reboot**

Reboot the PC when the installation is completed.

**Driver installation**

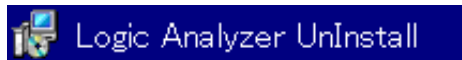
By default the driver is installed together with the main program. In case the PC requires a separate software driver installation, select USB_LA.inf file in the software package.

Uninstall, repair, modification

This page assumes the GLA software is already installed.

Uninstall

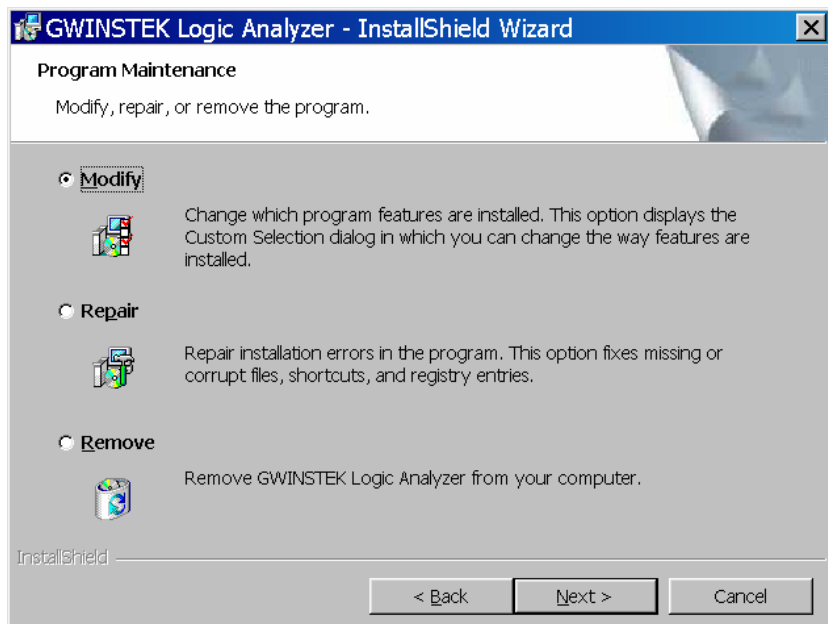
Select UnInstall from the PC startup menu,



Or select Remove in the Program Maintenance mode (see below).

Modify/repair

Insert the software CD-ROM and activate Setup.exe. The Program Maintenance menu appears.



Modify option: Lets the user re-select the installed features.

Repair option: Checks the program status and fixes any broken files.

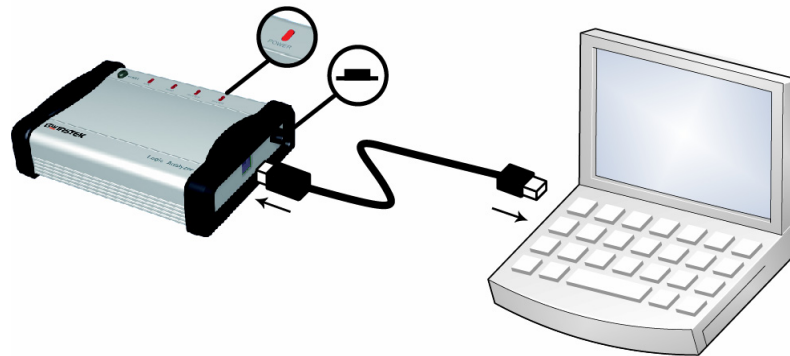
Remove option: Uninstalls the software.

Power Up

This section assumes the software is already installed.

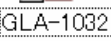
Hardware connection

Connect GLA and the PC via the USB cable. Press the GLA power switch and make sure the power LED turns On.



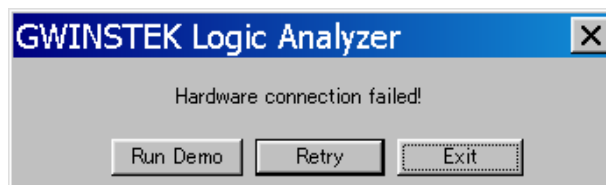
Software activation



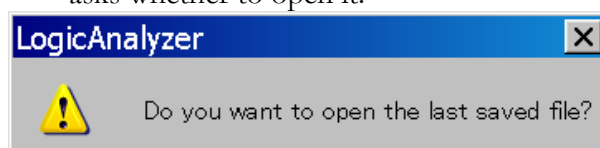
1. Double-click the desktop GLA icon  or activate the GLA from the program startup menu.



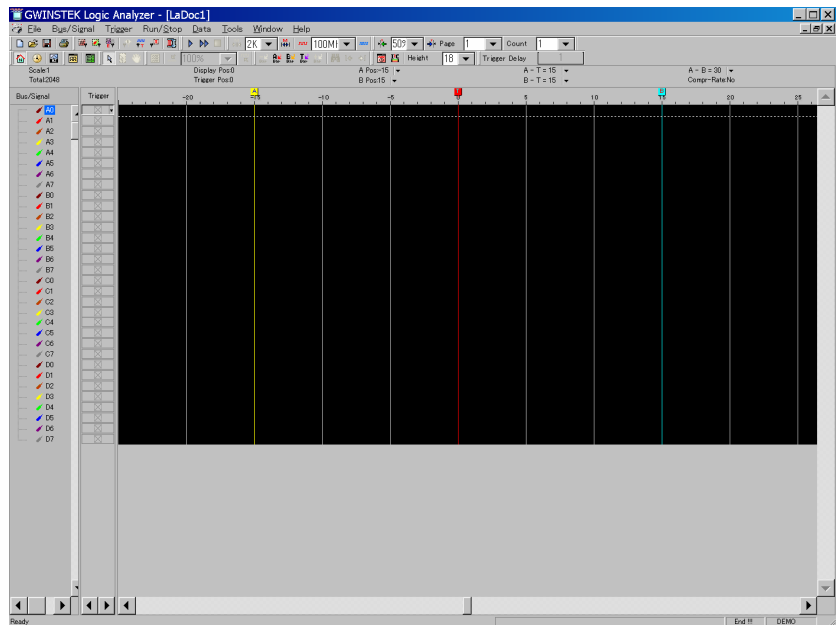
2. If the hardware connection error message appears, try the following.
 - * Reset the GLA USB connection and try again.
 - * Make sure GLA and PC are connected by a single USB cable (Do not use USB extension cable).



3. If there is already a setup file (*.gla) being saved, the software asks whether to open it.

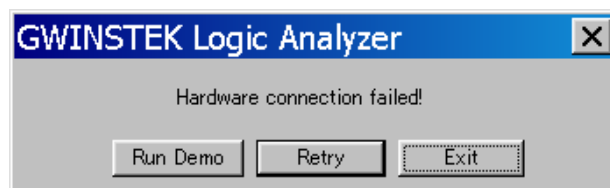


4. The display appears.



Demonstration
mode

You can still run the software without the GLA hardware. When the Hardware connection failure message appears, click Run Demo button.



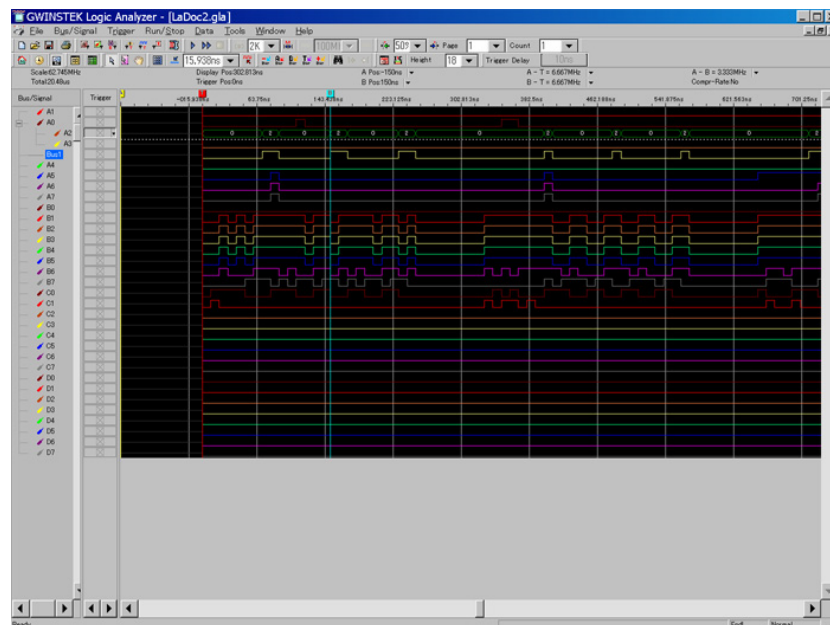
Most of the software features are available, except for signal capturing. You can even recall the old waveform data to be displayed.

Functionality Check

Hardware connection	Activate GLA (page26) and connect the signal source to one of the input terminals.
---------------------	--

Signal capturing	Do one of the following actions to capture the signal.
------------------	--

- Press the Start button on GLA
- Click the Run  button on the display
- Press F5 (shortcut for the single run)
- Select Single Run from the Run/Stop menu



Make sure the signals appear on the display, at the corresponding terminals.

File Operation

Open/Close	Open GLA software.....	30
	Close GLA software.....	30
	Create a file.....	30
	Open a file	31
	Close the file	31
Save	Save the project file	32
	Save the project file in a different name.....	32
	Export the data.....	32
	Save the display image.....	34
Printout	Print.....	36
	Print Preview.....	36
	Printer Setup.....	36
Handling multiple files	Switch between files.....	37
	Display multiple files	37

Open/Close

Open GLA software

Activates GLA software.

Startup Menu

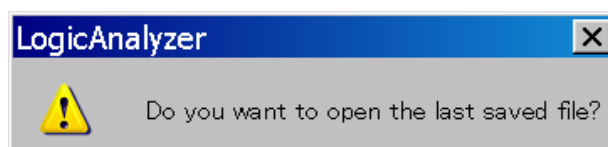


Desktop icon



Note

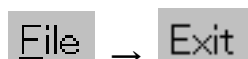
If there is already a setup file (*.gla) being saved, the software asks whether to open it or not.



Close GLA software

Closes GLA software.

Menu



Shortcut key

Alt+F4

Create a file

Creates a new project file.

Menu



Shortcut key

Ctrl+N

Icon



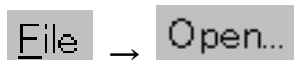
File format

LaDocx.gla (x stands for integers: 1, 2, 3...)

Open a file

Opens an existing setup file.

Menu



Shortcut key

Ctrl+O

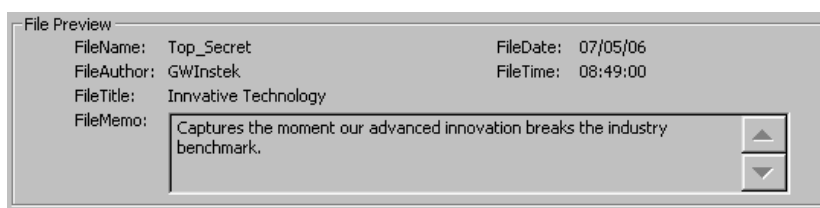
Icon



File format

*.gla

File properties



The File open dialogue windows shows the file properties of the pointed *.gla file.

File name, project, author, title, and note can be set at Save As dialogue (page32).

Close the file

Closes the active project file.

Menu



Shortcut key

Ctrl+F4

Save

Save the project file

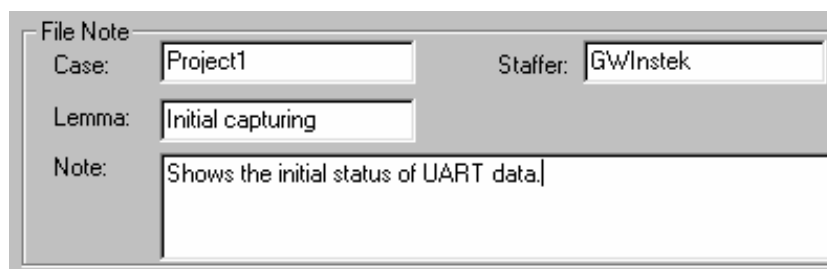
Overwrites and saves the active Logic Analyzer project file. If the file has never been saved before, the Save As window appears.

Menu	 → 
Shortcut key	Ctrl+S
Icon	

Save the project file in a different name

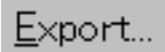
Saves the active Logic Analyzer file in a different name, or in a different directory.

Menu	 → 
File format	*.gla
Dialogue window	The Save As dialogue window includes File property corner where you can fill in the project name, project staff name, and additional note. These information can be viewed when opening the file,



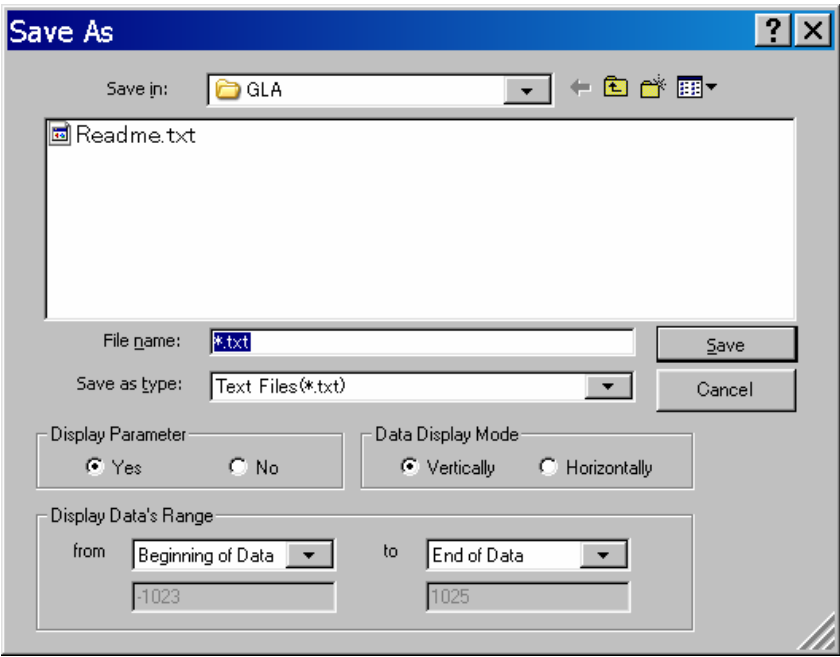
Export the data

Saves waveform data and setup information into *.txt or *.csv format.

Menu	 → 
------	---

Shortcut key Ctrl+Shift+E

Dialogue
window



File Type	*.txt	Plain Text format.
	*.csv	Comma-Separated Values format. Each waveform data is listed in tables as separate entities.

Display parameter	The setup information includes the following:	
	• File name, size, date • Sampling mode, sampling frequency • Ram size, data compression ratio • The number of Bus/channel • Trigger level, count, page, Enable setting • Bar position	
	Yes	The file contains system measurement setup information as well as waveform data.
	No	The file contains only the waveform data.

Data display mode	Vertical	Sets the waveform data format into: Horizontal direction – channel Vertical direction – waveform data
	Horizontal	Sets the waveform data format into: Horizontal direction – waveform data Vertical direction – channel

Display data
range

Specifies the range of the saved data. The gray area shows the position of the selected item.

- From:/ To:
- Beginning of data
 - End of data
 - Trigger bar
 - A bar
 - B bar
 - User defined

Save the display image

Saves the whole or part of the PC screen snapshot image, in Jpeg (*.jpg) or Bitmap (*.bmp) format.

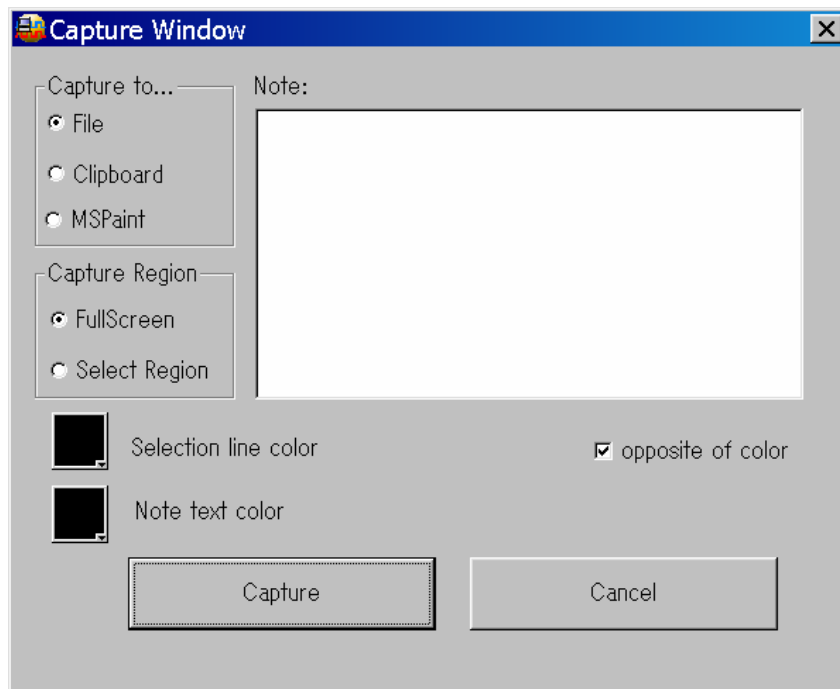
Menu

File → Capture Window...

Shortcut key

Ctrl+C

Dialogue
window

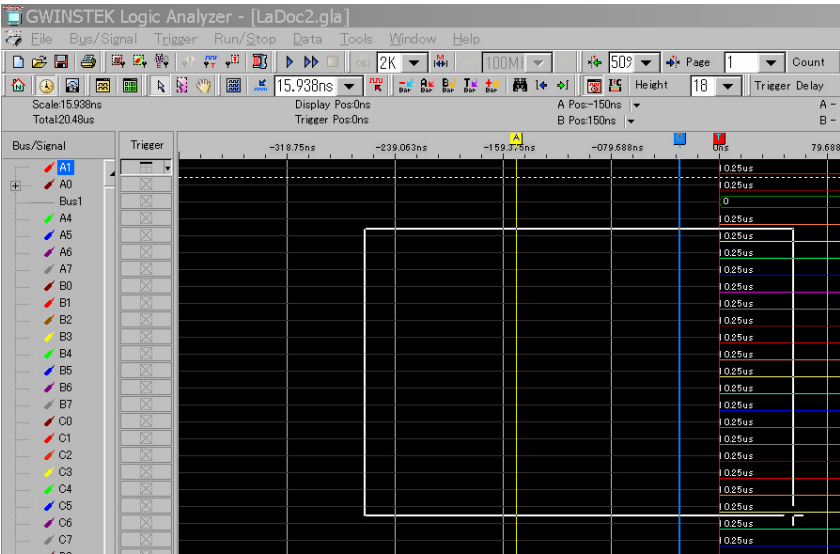


Note

Note:

Adds the entered comment to the captured snapshot.

	Note color	Clicking the icon opens the chart for selecting the note text color. Default: black.
		
Capture to...	File	The captured snapshot is saved to an external file. File format: *.jpg, *.bmp
	Clipboard	The captured snapshot is saved to the Windows Clipboard, to be pasted into other applications.
	MSPaint	The captured snapshot is opened in Microsoft Paint, in *.bmp format.
Capture region	FullScreen	The full screen is captured (same as pressing the PrtSc key).
	Select Region	A cropping tool appears, allowing capture of selected area.



Selection line	Clicking the icon opens the crop tool color chart. Checking the opposite of color
	☒ opposite of color selects the opposite of the specified color, as in the above figure (white line).

Printout

Print

Prints out the waveform image.

Menu  → 

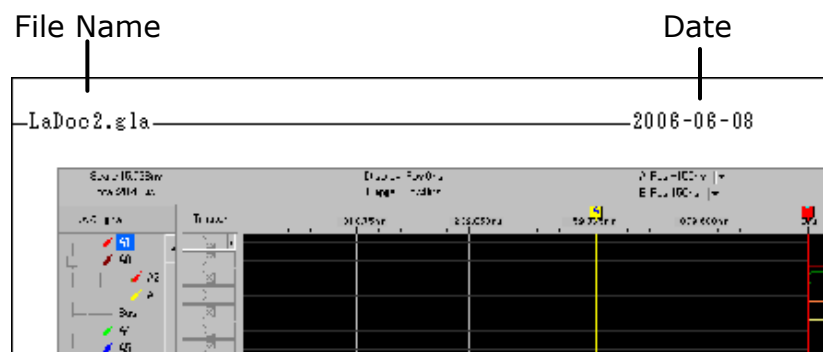
Shortcut key Ctrl+P

Icon 

Print Preview

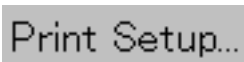
Shows waveform image printout preview. The file name and the date are also printed out.

Menu  → 



Printer Setup

Opens the standard printer setup dialog window.

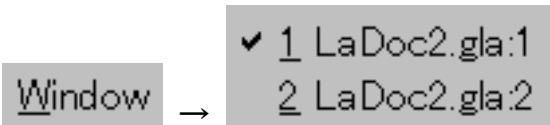
Menu  → 

Handling Multiple Files

This section assumes more than one files are already opened.

Switch between files

Menu Click the target file accessible from the Windows menu.

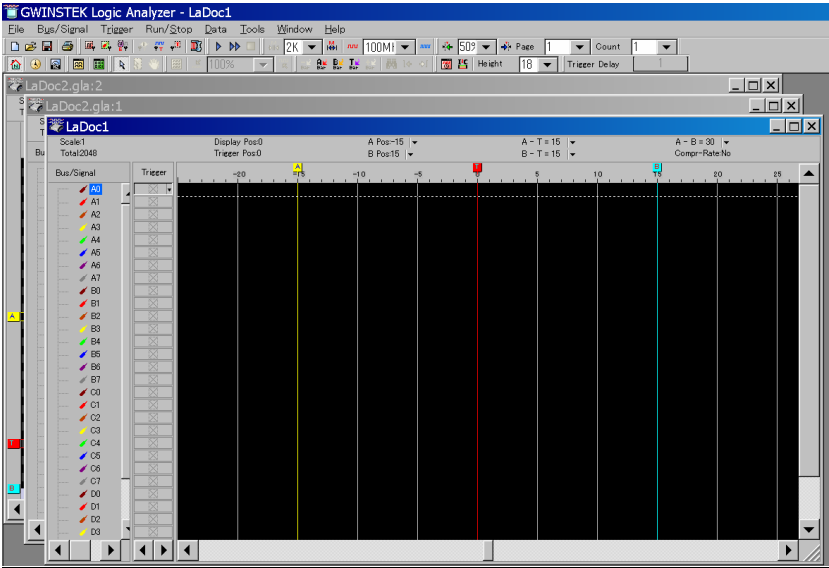


Shortcut key Ctrl+Tab

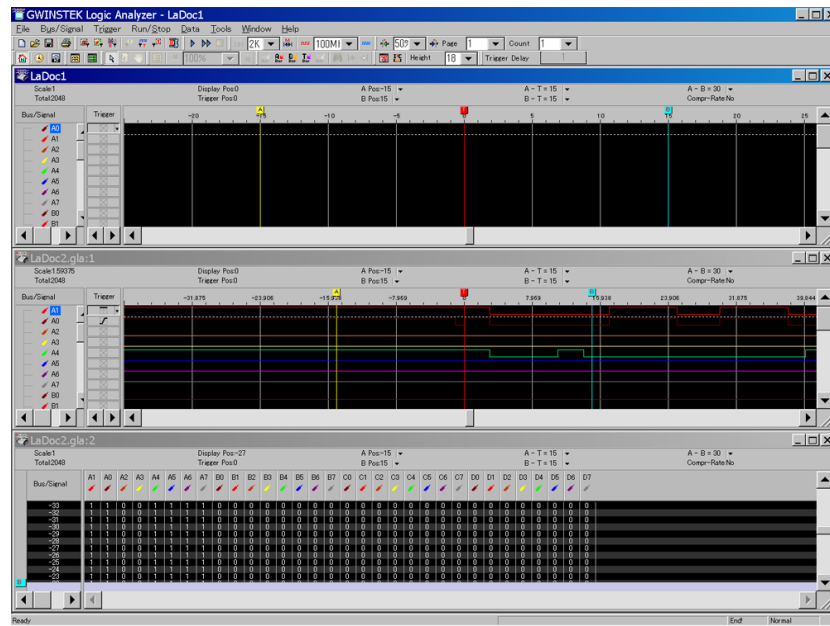
Display multiple files



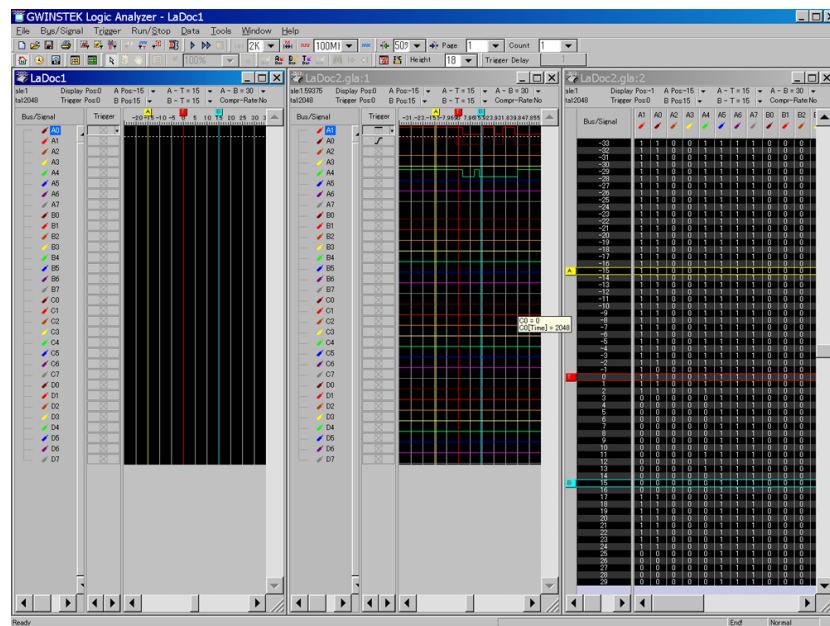
Cascade format



Horizontal format



Vertical format



Bus/Signal Setup

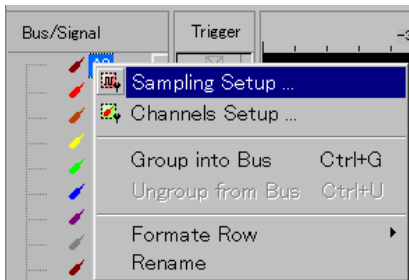
Sampling /	Clock source	41
Compression setup	Sampling RAM size	41
	Compression mode	42
Bus/Signal setup	Add/Delete.....	43
	Group/Ungroup	44
	Rename	45
	Hide/Show signals and buses	46

Sampling/Compression Setup

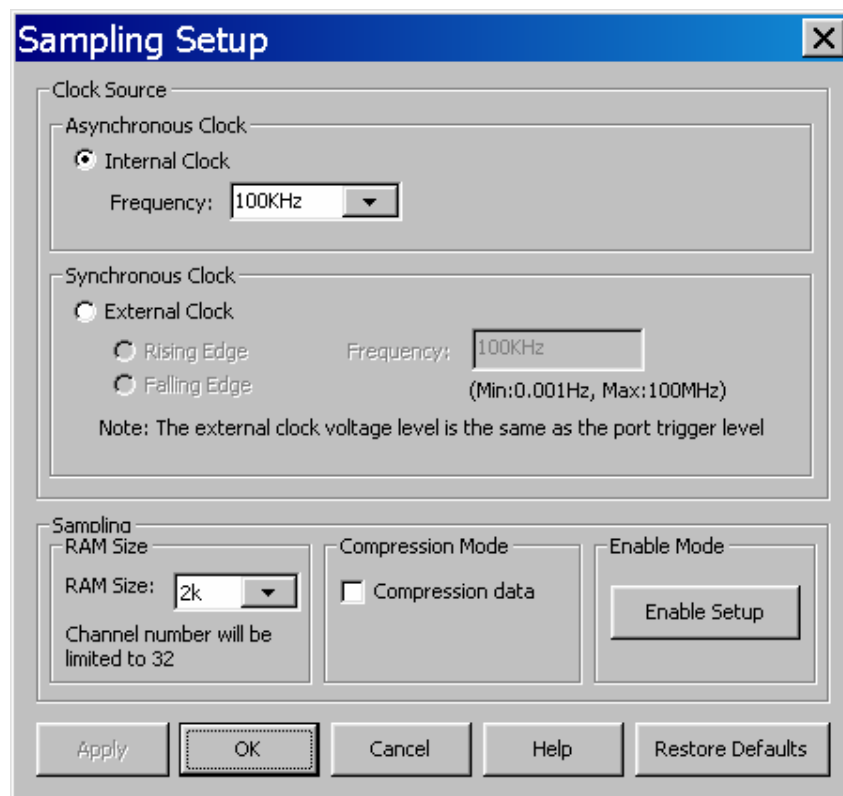
GLA can setup the clock source, sampling frequency, memory size, and data compression.

Menu  →  Sampling Setup ...

Icon 

Context menu  Right-click on the Bus/Signal list, then select Sampling Setup.

Dialogue Window



The Sampling Setup dialog box is titled "Sampling Setup" and contains the following sections:

- Clock Source:**
 - Asynchronous Clock:**
 - ☒ Internal Clock

Frequency: 100KHz
 - Synchronous Clock:**
 - ☐ External Clock

Frequency: 100KHz (Min:0.001Hz, Max:100MHz)

Note: The external clock voltage level is the same as the port trigger level

 - ☐ Rising Edge
 - ☐ Falling Edge
- Sampling:**
 - RAM Size: 2k

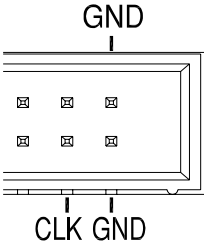
Channel number will be limited to 32
 - Compression Mode:**
 - ☐ Compression data
 - Enable Mode:**
 - Enable Setup

Buttons at the bottom: Apply, OK, Cancel, Help, Restore Defaults.

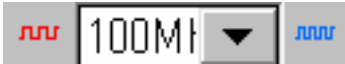
Clock source

Internal
(asynchronous)
clock

External
(synchronous)
clock



Toolbar icon



Frequency is selectable from 18 frequency range.

Range: 100Hz ~ 200MHz.

The clock signal needs to be connected to the CLK input terminal.

Range: 0.001Hz ~ 100MHz.

Rising edge or falling edge is selectable.

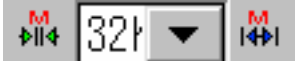


Sampling frequency

To ensure accurate measurement, choose a sampling frequency at least four times that of the target signal.

Sampling RAM size

Toolbar icon



Select the amount of waveform memory GLA captures in a single run. Note that large memory size slows down display update rate.

RAM size	Channel	Compression	Enable mode
2k bits	16/32	Yes	Yes
16k bits	16/32	Yes	Yes
32k bits	16/32	Yes	Yes
64k bits	16/32	Yes	Yes
128k bits	16/32	Yes	Yes
256k bits (GLA-1016/1032)	16 only	No	No
256k bits (GLA-1132)	32	Yes	Yes
512k bits (GLA-1132 only)	32	Yes	Yes
1M bits (GLA-1132 only)	32	Yes	Yes
2M bits (GLA-1132 only)	16	No	No

41



limitation

Using large amount of memory (256k bits for GLA-1016/1032, 2M bits for GLA-1132) imposes the following restrictions.

- Only 16 channels, A0 ~ B7, available
- Compression not available
- Enable mode not available

Compression mode

Toolbar Icon



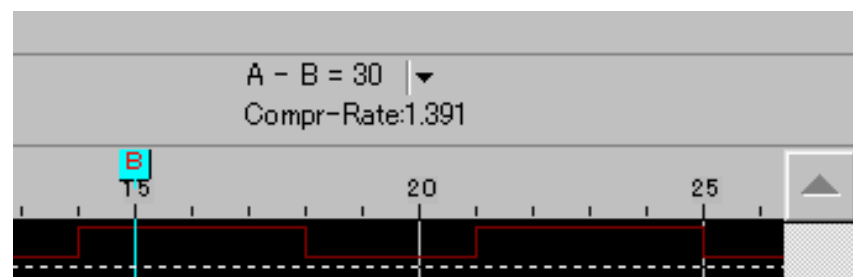
When selected, GLA uses a lossless compression technique to expand the signal record length. The compression ratio is maximum 255, automatically adjusted.

The maximum record length per channel is:

GLA-1016, 1032: 128kbit x 255 = 32Mbit

GLA-1132: 1024kbit x 255 = 256Mbit

The actual compression rate is displayed on the upper-right side of the display (In the below case, 1.391).



Compression limitation

Compression mode imposes the following restrictions.

- For 32 channel model, channel number is reduced to 24, A0 ~ C7, regardless of the memory size.
- Enable mode becomes unavailable.

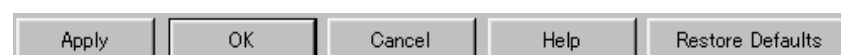
Enable mode

Opens the Enable function setup dialogue window. For details, see the Trigger setup chapter, page57.

When completed...

Press Apply/OK/Cancel button to save or cancel the setting.

Restore Defaults button setting: Internal clock, 100MHz/ 2k RAM size/ No compression.



Signal/Bus setup

Add/Delete

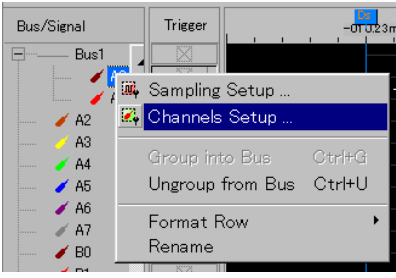
Menu

Bus/Signal →  Channels Setup ...

Icon



Context menu



Right-click on the Bus/Signal list and select Channel Setup.

Dialogue window

Channels Setup

Add Bus/SignalDelete Bus/SignalDelete AllRestore Defaults

Port	D								C								B								A							
Tr. Condition																																
En. Qualifier																																
A0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
A1	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
A2	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
A3	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
A4	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
A5	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
A6	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
A7	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assignment Count	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

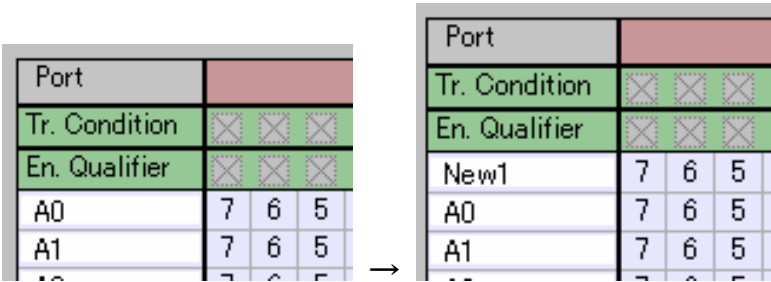
OkCancelHelp

Use the right side bar to scroll up or down. Port C and D are not available in GLA-1016.

Add Bus/Signal

Click the Add Bus/Signal button. A new signal named Newx (x stands for 0, 1, 2...) appears on top of A0.





Delete

Bus/Signal

Delete Bus/Signal

Delete All

Select the target signal/bus and click either:

Delete Bus/Signal – the selected single bus or signal. Or

Delete All – all buses and signals.

Restore Default

Restore Defaults

Restores the default status (all channels are active).

Group/Ungroup

Group signals into bus, or ungroup a bus into signals.

Menu

Bus/Signal → Group into Bus (group)

Bus/Signal → Ungroup from Bus (ungroup)

Shortcut keys

Ctrl+G (group)

Ctrl+U (ungroup)

Method1

Open the Channels setup dialogue window, select the grouped signals and press Ok. The following example shows that ChannelD0 ~ D3 are grouped into D0 bus.

Channel Setup dialogue

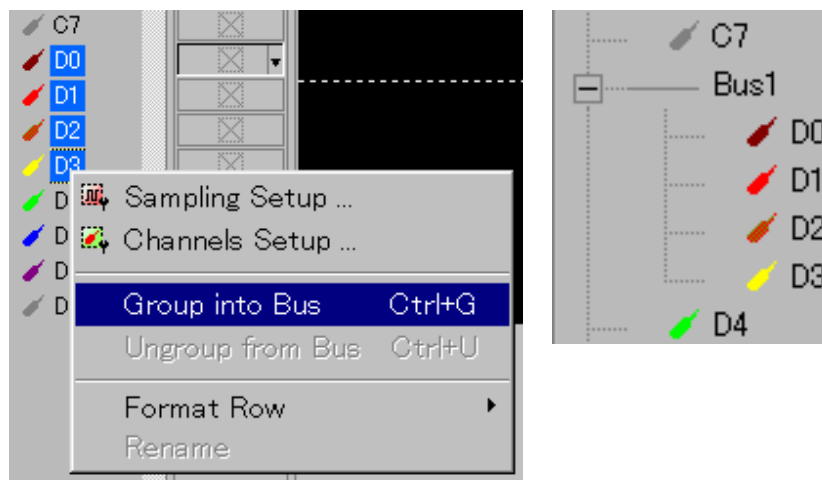
Result

Port	D							
Tr. Condition	X	X	X	X	X	X	X	X
En. Qualifier	X	X	X	X	X	X	X	X
D0	7	6	5	4	3	2	1	0
D1	7	6	5	4	3	2	1	0

Method2

In the main display, select the range of signals by pressing the Shift key and clicking the signal names. Then choose Bus/Signal → Group. A bus named Busx (x stands for 1, 2, 3...) is formed. To ungroup the bus, choose Ungroup from Bus menu.

Picking up the signal (D0 ~ D3) Result



Rename

Method1

Click the target signal in the display.

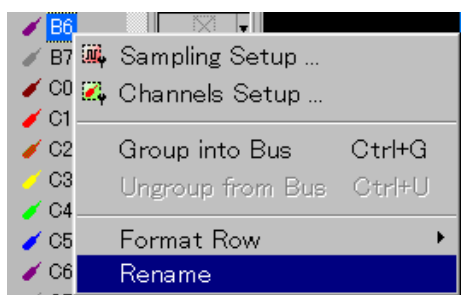


Click again on the target signal, OR

Select Rename from the menu,

Bus/Signal → Rename OR

Right-click and select Rename from the context menu.



Type in the new name and press Enter key to confirm.



Method 2

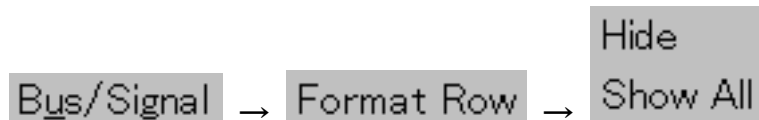
In the Channels setup dialogue window (page43), Click the target signal name, and type in the new name.



Hide/Show signals and buses

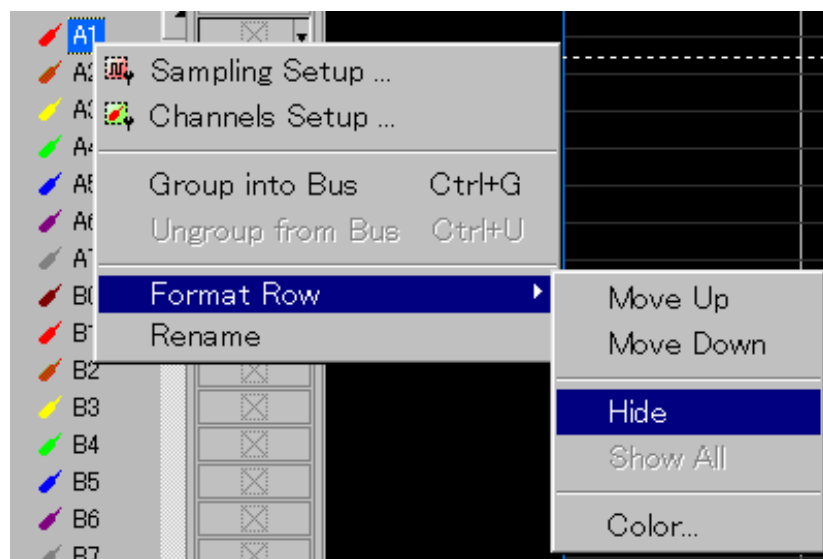
This function hides signals and buses from display but do not delete them. Show All function can reveal them. For deleting signals and buses, see page43.

Menu



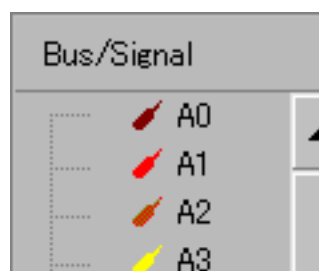
Context menu

Right-click on Bus/Signal list and select Format Row menu.

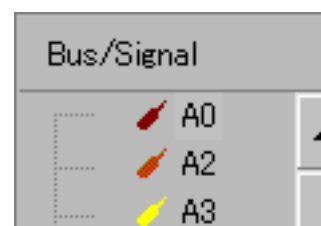


Example

Before hiding A1



After hiding A1



Trigger Setup

This chapter describes how to configure the triggering conditions.

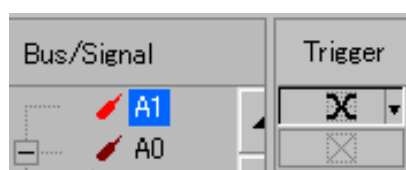
Signal triggering condition setup	Set the condition individually.....	48
	Set conditions for multiple channels	49
	Reset all trigger conditions	50
Bus triggering condition setup	Operator (Trigger condition)	52
	Reset all trigger conditions	52
General triggering properties setup	Trigger level	53
	Trigger Count	54
	Trigger Page	54
	Trigger position.....	56
	Trigger delay	56
Enable Trigger function setup	Enable Qualifier	58
	Enable Period	59
	Delay Start Point	59
Trigger output signal	Trigger Output Signal.....	61

Signal Triggering Condition Setup

Trigger condition	Don't care 	GLA captures all data regardless of its condition.
	High 	GLA triggers capturing the signal when the level is high.
	Low 	GLA triggers capturing the signal when the level is low.
	Rising edge 	GLA triggers capturing the signal when the level is changing from low to high.
	Falling edge 	GLA triggers capturing the signal when the level is changing from high to low.
	Either edge 	GLA triggers capturing the signal when the level is changing from one level to another, low to high or high to low.

Set the condition individually The following method sets the trigger condition for each channel individually.

Method1



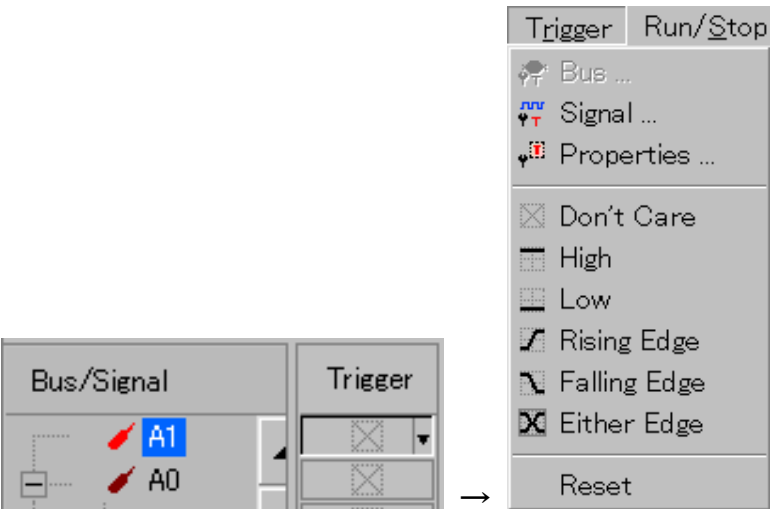
Select the target signal (A1 in this case) and:

Click the Trigger condition icon repeatedly

OR

Press the space bar repeatedly.

Method2

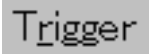


Select the target signal (A1 in this case) and click the Trigger list, then select the trigger condition from the Trigger menu.

Set conditions for multiple channels

This method sets the trigger condition for multiple channels at once.

Open the Trigger dialogue window.

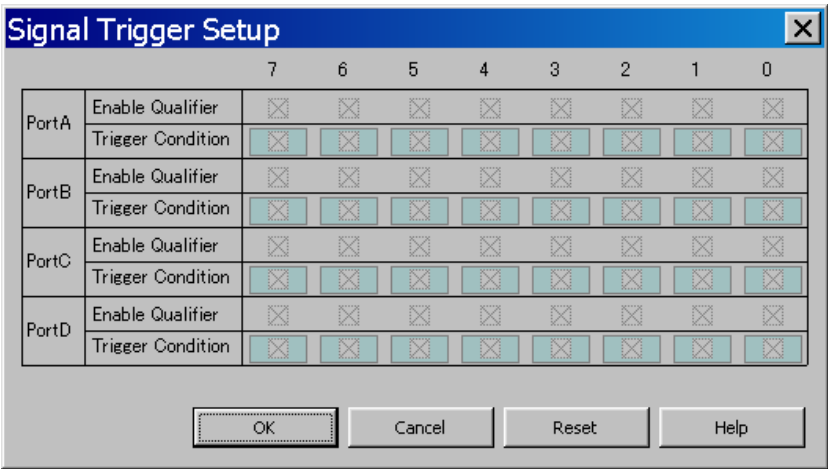
Menu  → 

Icon 

Context menu 

Right-click on the Trigger list area and select Signal.

Dialogue window

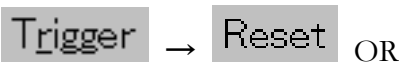


Click the the target signal repeatedly and select the appropriate trigger condition.

Reset all trigger conditions

Resets all the channel trigger conditions to Don't care (default) state.

Choose Reset from the Trigger menu



Click the Reset button in Signal Trigger Setup dialogue.



Bus Triggering Condition Setup

Menu

Trigger →  Bus ...

Icon

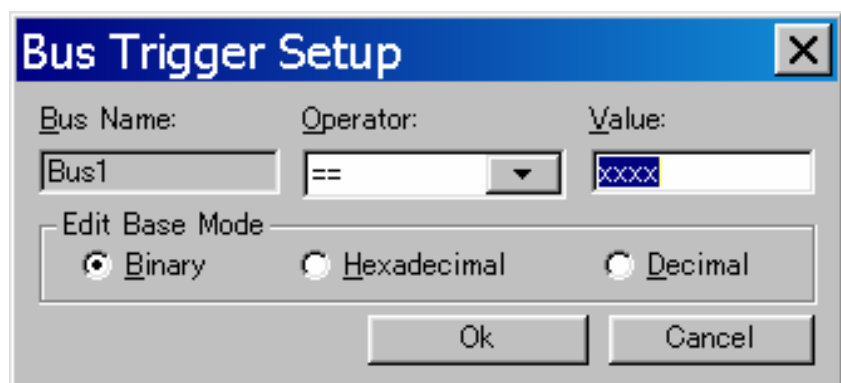


Context menu



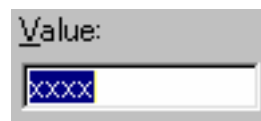
Right-click on the Trigger list for the target bus (Bus1 in this case) and select Bus menu.

Dialogue window



Operator (Trigger condition) ==

GLA triggers capturing data when the entered value matches the real data.



Binary

Sets the value in binary mode: 0, 1, x (don't care).

Hexadecimal

Sets the value in Hexadecimal value: 0 ~ F.

Decimal

Sets the value in Decimal value: 0 ~ 9.

Don't care

GLA triggers capturing data regardless of the value.

Reset all trigger conditions

Resets all the bus trigger conditions to Don't care (default) state. Choose Reset from the Trigger menu.



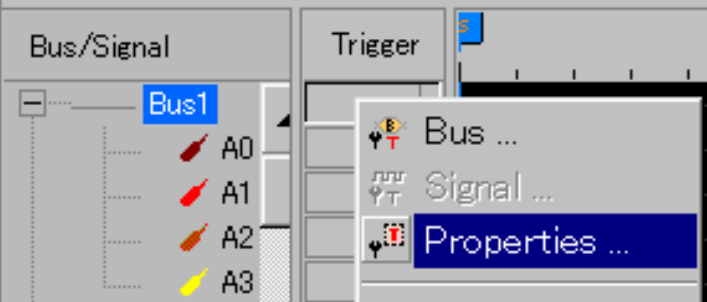
General Triggering Properties Setup

This function sets the triggering properties applicable to all channels and buses.

Menu Trigger →  Properties ...

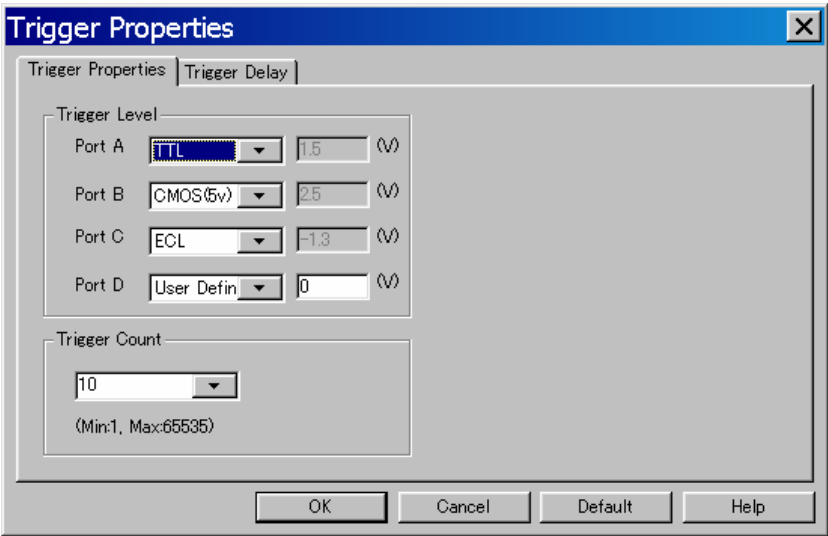
Icon 

Context menu



Right-click on the Trigger list and select Properties menu.

Trigger Properties
Dialogue window



Port C and Port D are not available for GLA-1016.

Trigger level

Set the triggering level for each port, A ~ D.

Type	Level
TTL	1.5V
CMOS (5V)	5V
CMOS (3.3V)	3.3V
ECL	-1.3V
User Defined	-6 ~ 6V

Trigger Count

Toolbar icon



Sets the number of times GLA skips triggering condition. Setting is available in pull-down (1, 2, 3, 4, 5, 10, 15, 20) or direct entering.

Example



GLA starts capturing data at the first triggering condition (default).

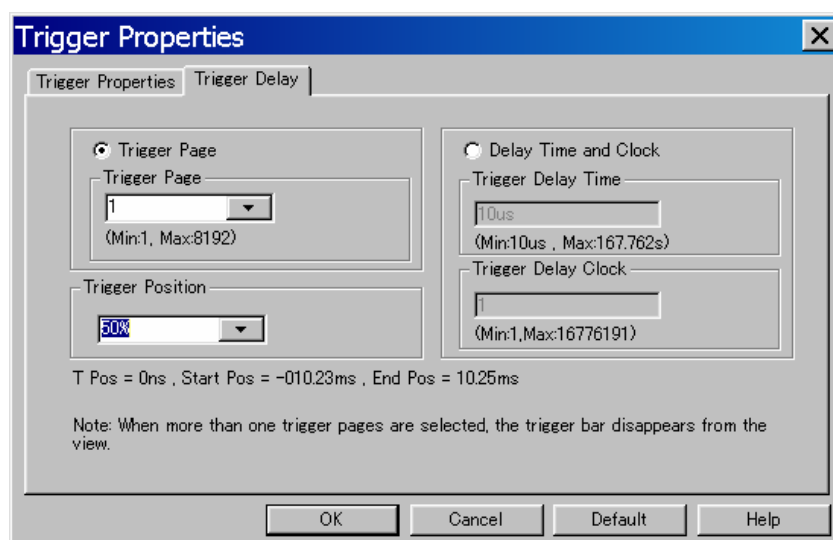


GLA starts capturing data at the fifth triggering condition.



You can directly type in any number, up to 65,535.

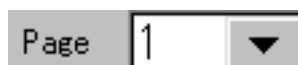
Trigger Delay
dialogue window



Select the Trigger Delay tab in the Trigger Properties dialogue.

Trigger Page

Toolbar icon



This function sets the length of skipped waveform (in data memory blocks) after the triggering condition. Setting is available in pull-down (1, 2, 3, 4, 5, 10, 15) or direct entering.

Waveform data in a single page = Sampling RAM size
(for RAM size setting, see page41)

Maximum trigger page for different RAM size

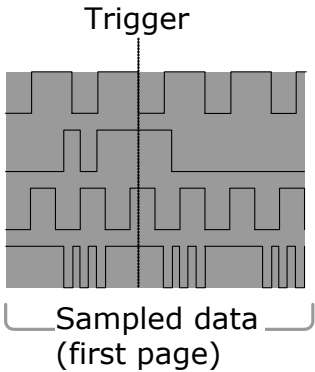
RAM size	GLA-1016	GLA-1032	GLA-1132
2Kbit	8192	8192	8192
16Kbit	1024	1024	1024
32Kbit	512	512	512

64Kbit	256	256	256
128Kbit	128	128	128
256Kbit	128	128	64
512Kbit	N/A	N/A	32
1Mbit	N/A	N/A	16
2Mbit	N/A	N/A	16

Trigger Page
Example

1

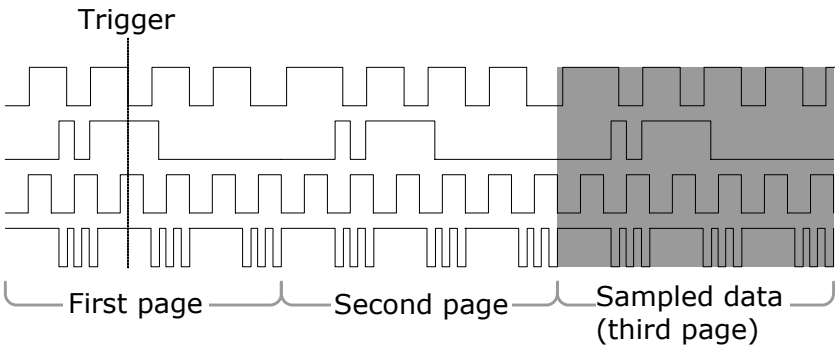
GLA captures the data at the first triggering condition (default).



Sampled data = the first memory block

3

GLA captures the data at the third memory block after triggering condition occurs.



Sampled data = the third memory block

4567

(Min:1, Max:8192)

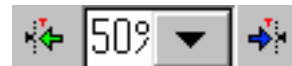
You can directly type in any number, up to the value shown below.

Trigger page /
delay

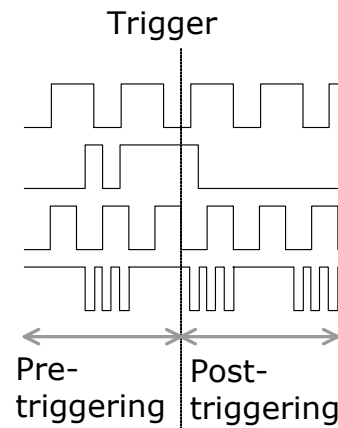
Trigger page disables Trigger delay/clock function (page56), vice versa.

Trigger position

Toolbar icon



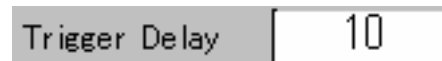
Sets the amount of pre-triggering data that GLA captures, selectable from the pull-down menu.



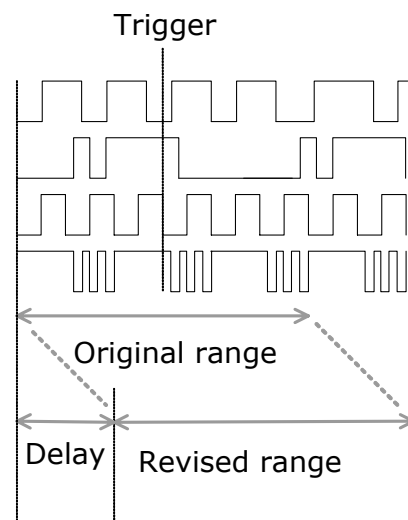
- 0% means GLA starts capturing data right after the triggering condition (no pre-triggering data).
- 50% means half of the captured data belongs to waveform prior to the triggering condition (default).
- 100% means all of the captured data belongs to waveform prior to the triggering condition.

Trigger delay

Toolbar icon



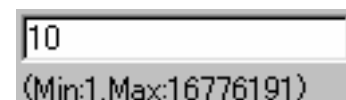
Delays the data capturing range in reference to the Trigger condition.



The amount of delay can be set as Time...



Or number of clocks.



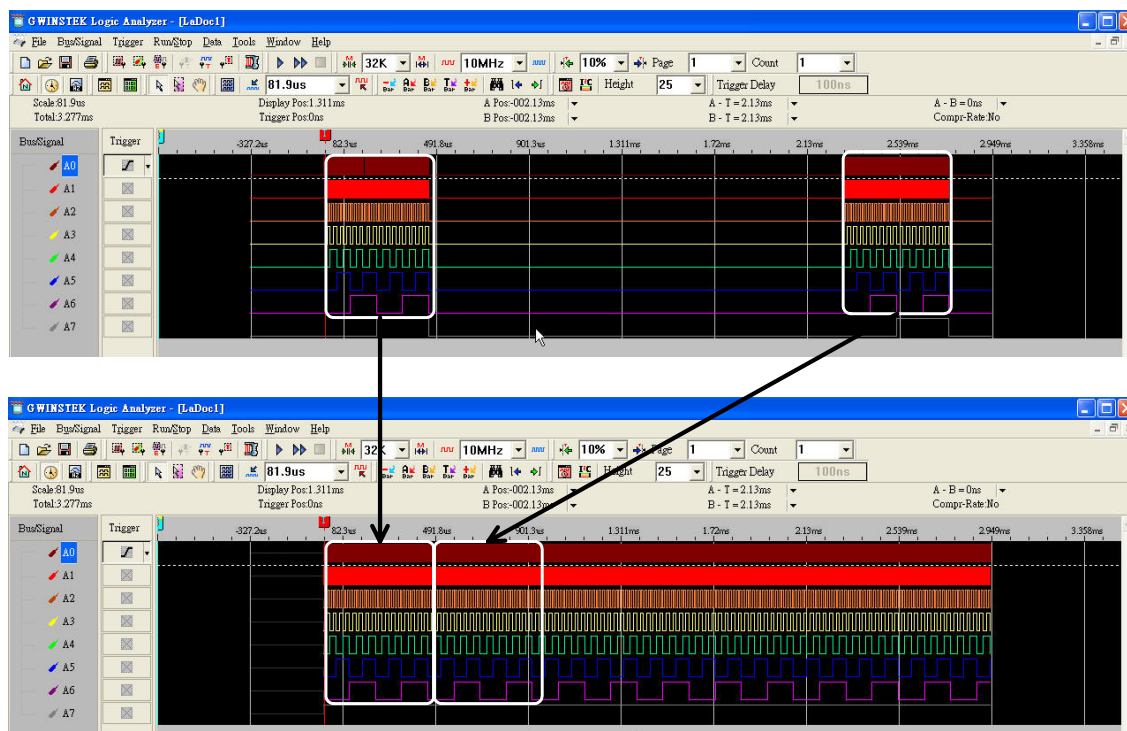
Trigger delay /
Trigger page

Trigger delay disables Trigger page function (page54), vice versa.



Enable Trigger Function Setup

Enable function lets GLA capture data portions only that match specified waveform condition – in other words, filters out unnecessary signal. The collected data portions are presented as a continuous stream of signal.



NOT available

- When using 128k byte memory for each channel (page41).
- When using the Compression mode (page42).

Menu

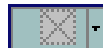
Select Sampling Setup from the Bus/Signal menu. Click Enable Setup button in the dialogue window.



Dialogue window

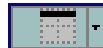
Enable Qualifier Click on the target channel icon and select the condition.

Don't care



The signal level does not matter – always captured (default).

High



The signal level must be high.

Low



The signal level must be low.

Example

The following Enable condition means:

		7	6	5	4	3	2	1	0
PortA	Trigger Condition								
	Enable Qualifier								

GLA captures signals only when Port A has the following condition.

A0 ~ A7: 01101101



The minimum distance, between each Enable qualified data block, is 2 clocks. Otherwise (if the distance is only one clock) GLA continues capturing data and do not delete unnecessary bits.

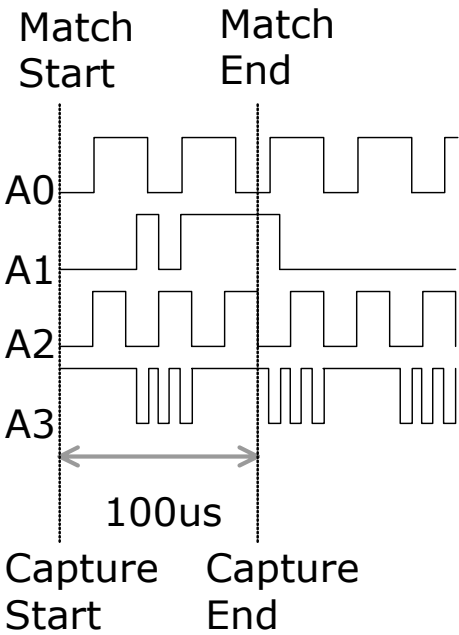
Enable Period	This options controls when GLA actually captures data, in reference to the Enable Qualifier condition set. Check the Enable Delay radio button. ☒ Enable Delay
According to	GLA captures signals when input signals match the Enable Qualifier.
Opposite of	GLA captures signals when input signals DO NOT match the Enable Qualifier.

Delay Start Point This function fine-tunes the length of captured waveform, in reference to the Enable Qualifier condition. Delay Time configures the length of time (user-defined). Three types of delay setting, Start Edge, End Edge, and Period+Delay are available.

Example Enable Qualifier
A0 ~ A3 condition is set as follows.
Enable Qualifier condition: 0001, Delay Time: 100us

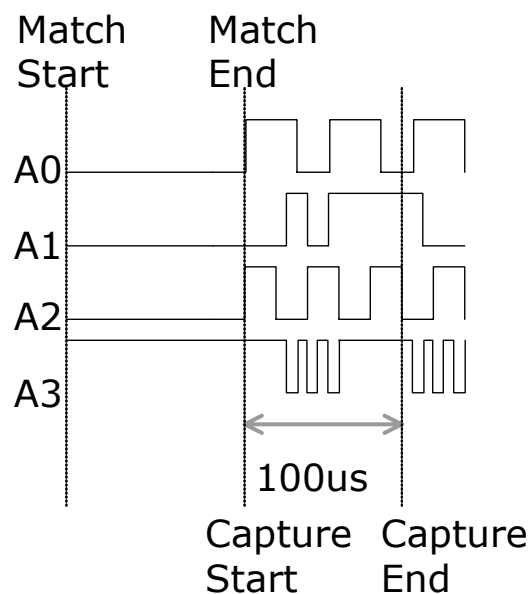


Start Edge GLA starts recording (capturing) signals at the beginning of Enable Qualifier match, for the Delay Time duration.



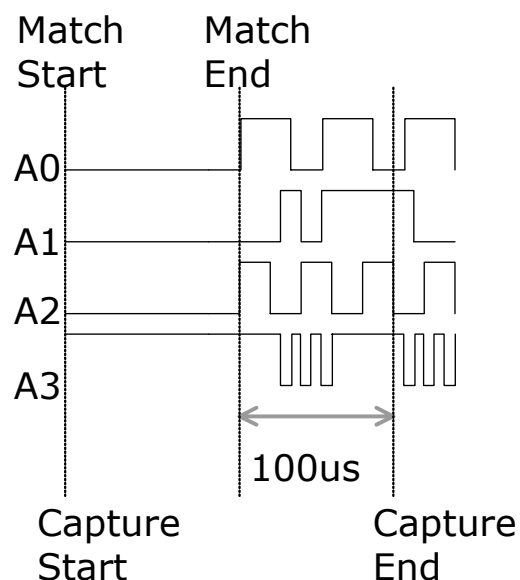
End Edge

GLA starts recording (capturing) signals at the end of Enable Qualifier match, for the Delay Time duration.



Period + Delay

GLA starts recording (capturing) signals at the beginning of Enable Qualifier match, continues after the end of match for the Delay Time duration.



When completed...

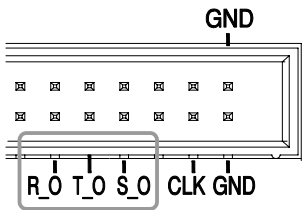
When the Enable setting is completed, press OK (confirm) or Cancel button. Restore Defaults disables all the qualifier settings.



Trigger Output Signal

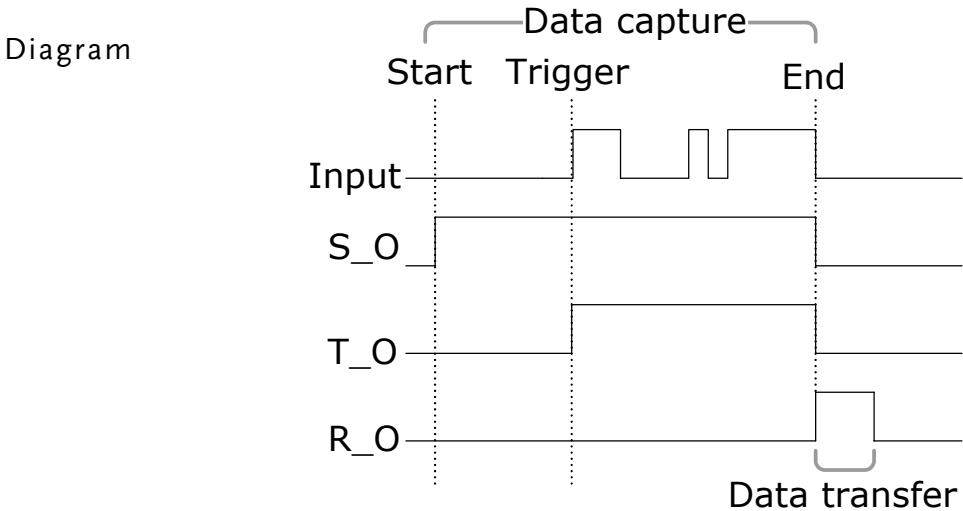
GLA has three output signals which can be used for monitoring trigger condition.

Connector



Three signals, S_O, T_O, and R_O, output high level (3.3V) under specific conditions.

Signal description	S_O (Start Out)	Outputs high level from when the Start key is pressed, or the Run command becomes active, until the end of data capturing.   or F5
	T_O (Trigger Out)	Outputs high level from when the trigger condition is met, until the end of data capturing.
	R_O (Read Out)	Outputs high level from when the data capturing has finished (GLA starts transferring data to PC) until the transfer is completed.



GLA cannot capture the next data while R_O is high (data transfer not completed yet).

Display Setup

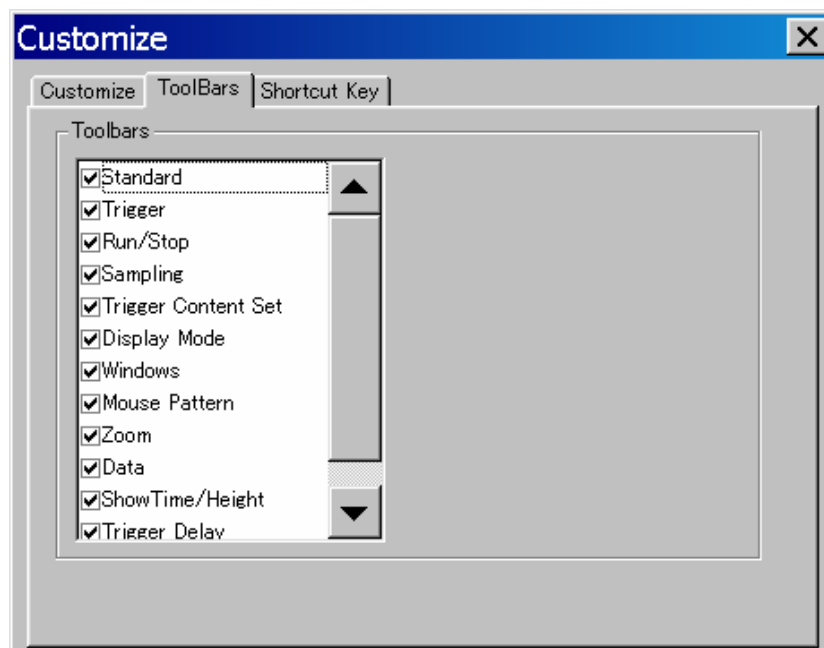
Toolbar setup	Toolbar Setup	63
	Toolbar list	64
Horizontal / Vertical scale setup	Horizontal unit.....	65
	Horizontal ruler	65
	Waveform height	66
Waveform view setup	Signal display	67
	Enable/Disable grid.....	68
	Square/Sawtooth waveform	69
	Waveform timing display.....	69
Color setup	Background color	71
	Waveform (Foreground) color	72

Toolbar Setup

Menu

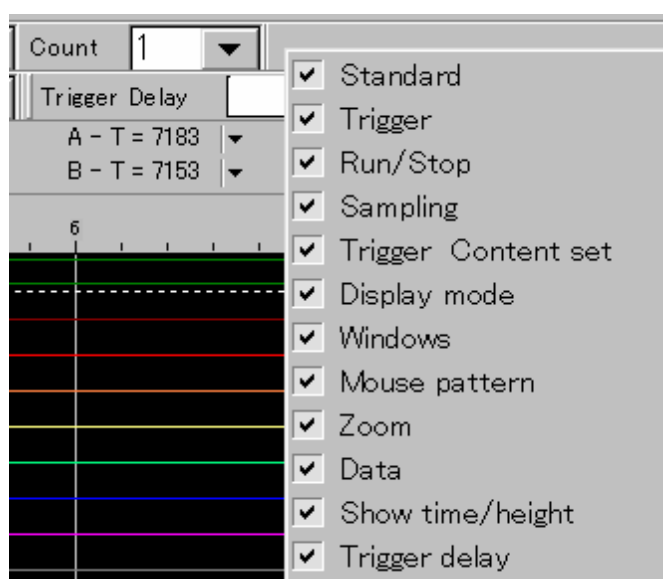
Select Customize from the Tools menu. Click the Toolbars tab. Click the target toolbar to activate/deactivate it.

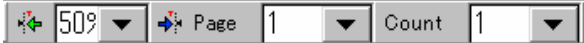
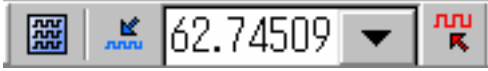
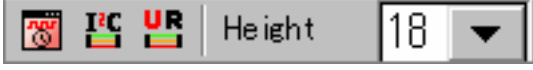
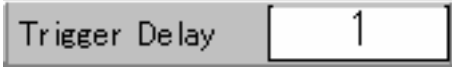
Tools → Customize ...



Context menu

Right-click on the blank space in the Toolbar. Click the target toolbar to activate/de-activate each group.



Toolbar list	Standard	
	Trigger	
	Run/Stop	
	Sampling	
	Trigger Content Set	
	Display Mode	
	Windows	
	Mouse Pattern	
	Zoom	
	Data	
	Show Time/Height	
	Trigger Delay	

Horizontal/Vertical Scale Setup

Horizontal unit

Sets the horizontal unit used in the Scale and Position bar.

Menu Tools → Customize ...

Dialogue Window

Customize

Customize

ToolBars

Shortcut Key

Position Display Area Data Mode

☐ Address Mode

☒ Time Mode

☐ Frequency Mode

Icon & Display	Address mode (default)	Time mode	Frequency mode
	Scale:1.59375	Scale:15.938ns	Scale:62.745MHz
	A - T = 15	A - T = 150ns	A - T = 6.667MHz

Horizontal ruler

Sets the horizontal ruler scale.

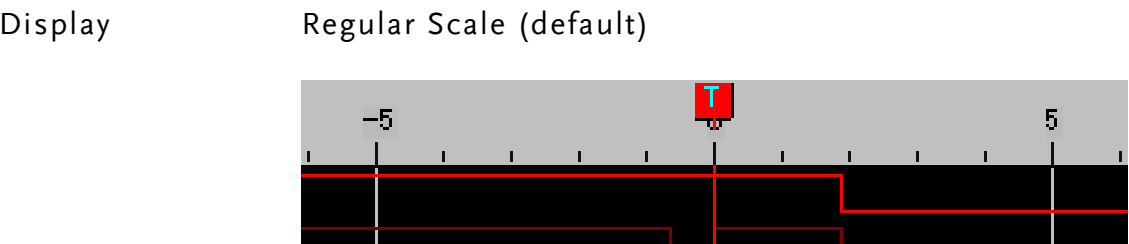
Menu Tools → Customize ... → Customize

Dialogue Window

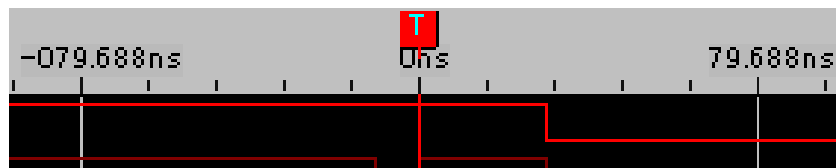
Ruler Mode

☐ Regular Scale

☒ Time/Address Scale



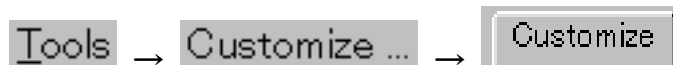
Time/Address Scale



Waveform height

Sets the signal/bus displayed height.

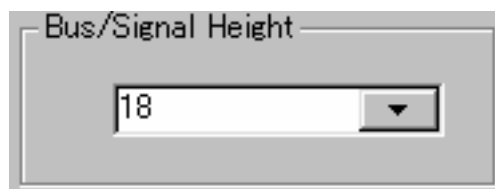
Menu



Toolbar icon



Dialogue Window

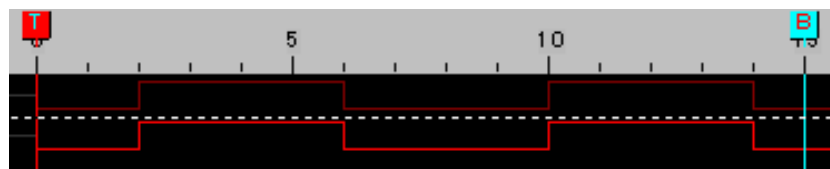


Range

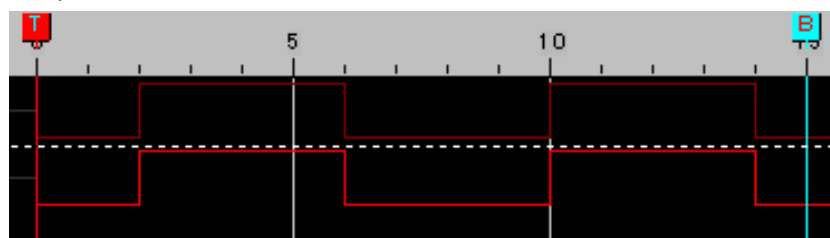
18 (default) ~ 100 points

Display

18 points (default)



30 points



Signal display

- Waveform view puts each channel waveform horizontally.
- Listing view puts each channel vertically, in binary form.

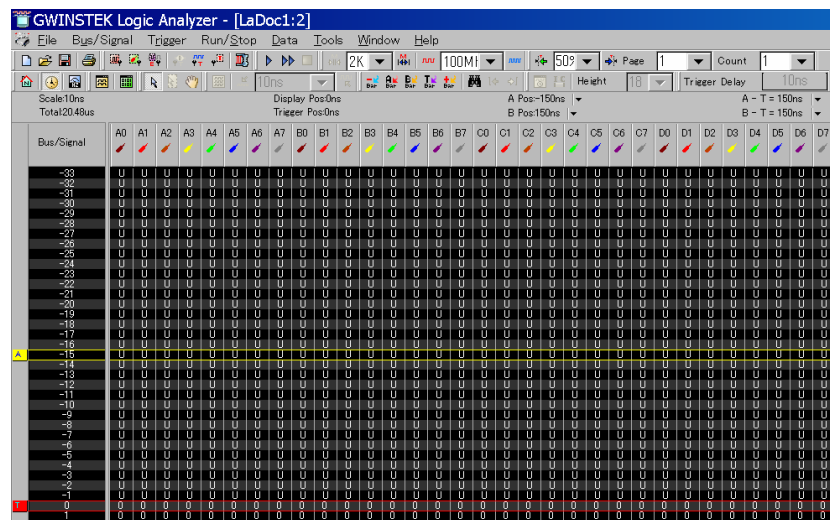
Window →

- Waveform Display
- Listing Display



The diagram illustrates two different visual representations of a 4x4 grid. The top view, labeled "(Waveform view)", shows a grid with yellow cells and black borders. The bottom view, labeled "(Listing view)", shows a grid with green cells and black borders. Both views are presented as small square icons with a gray background.

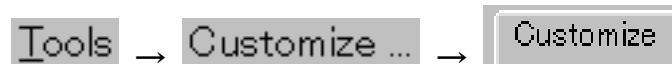
Listing view



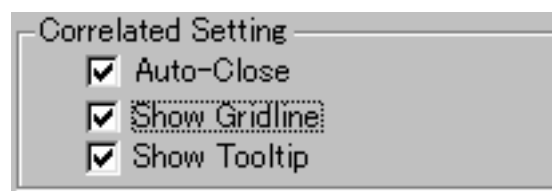
Enable/Disable grid

Show/hide the vertical gridline in the waveform area.

Menu

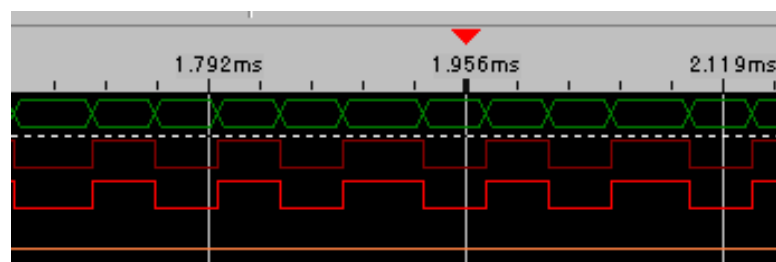


Dialogue Window

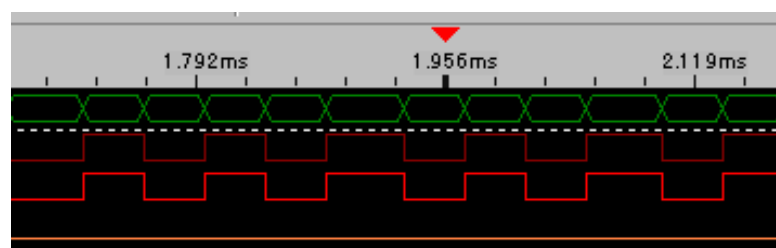


Display

With grid (default)



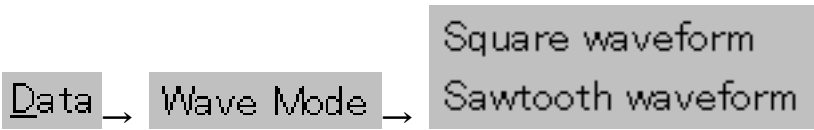
Without grid



Square/Sawtooth waveform

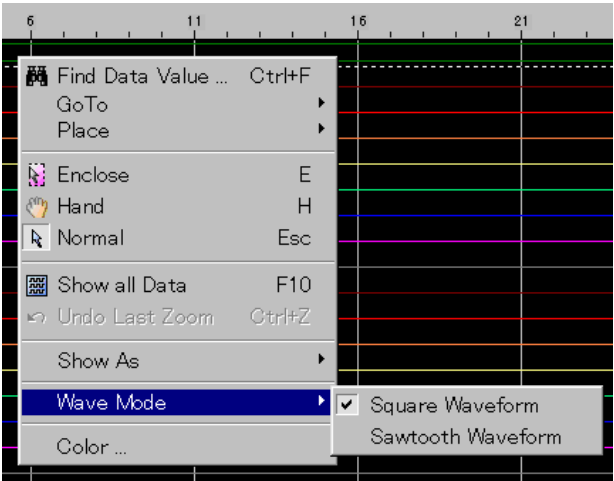
Selects the waveform edge shape.

Menu



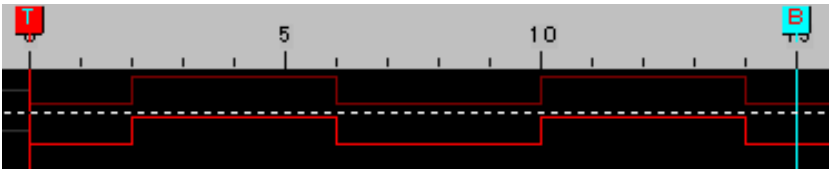
Context menu

Right-click on the waveform area and select Wave Mode.

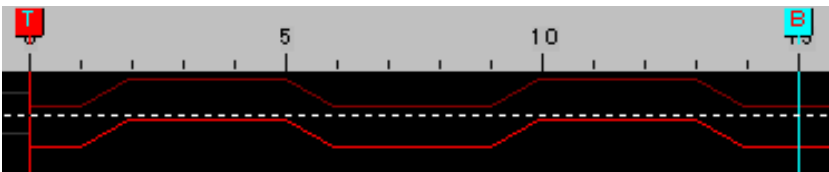


Display

Square waveform (default)



Sawtooth waveform



Waveform timing display

Shows/hides timing information inside waveforms.

Menu

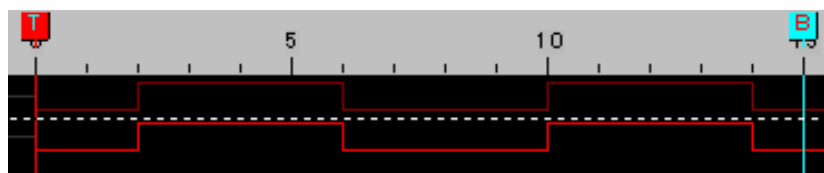


Toolbar icon

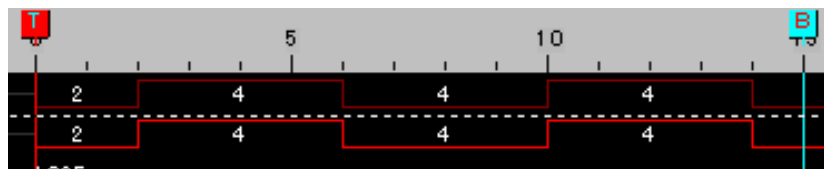


Display

Without timing information (default)



With timing information



Color Setup

Background color

Sets the waveform background color.

Menu

Tools → Customize ... → Customize

Dialogue Window

Color

Background ColorForeGround Color

☒ After the background is altered, corresponding color automatic change contrast ratio .

Change color

Press the Background Color bar.

Background Color



Click the color bar and select color from the color chart.

Contrast with foreground

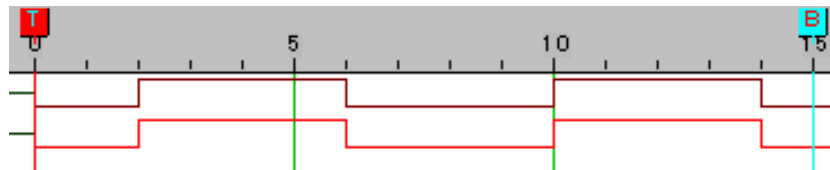
Check the radio if you want the foreground (waveform) color to be automatically adjusted, following the background color change.

☒ After the background is altered, corresponding color automatic change contrast ratio .

Display

Black background (default)

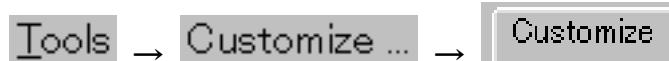
White background



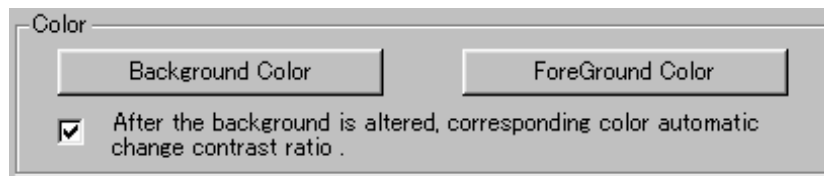
Waveform (Foreground) color

Sets the waveform color.

Menu



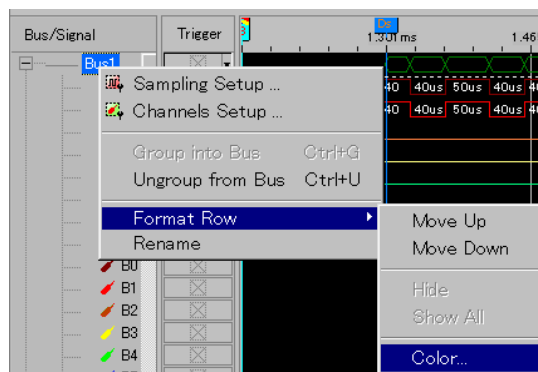
Dialogue window



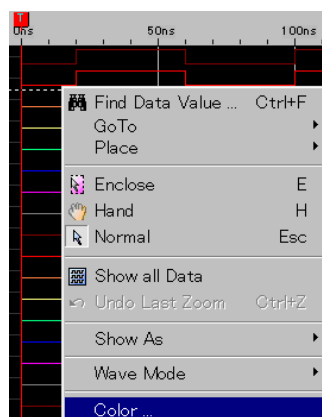
Context menu

Right-click on the Bus/Signal list, Trigger list, or on the waveform, select Color menu. The target waveform color can be changed on the spot.

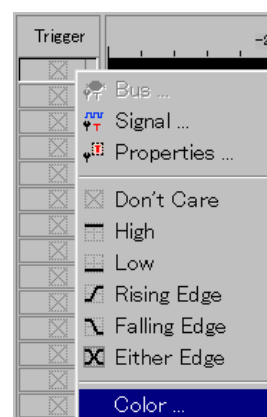
Bus/Signal list



Waveform

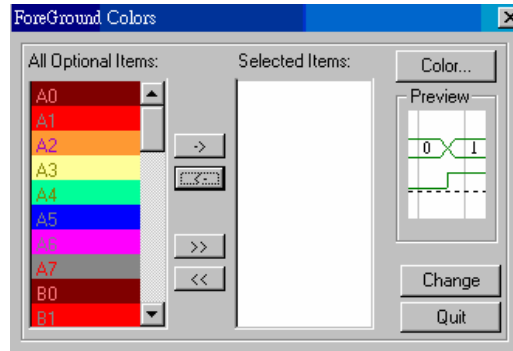


Trigger list



Dialogue Window

Use the single arrow  to change individual waveform color.
Use the dual arrows  to change all waveform colors at once.



Restore default
settings

When the changes become complicated, use the Restore button  in the Configure dialogue window.

Signal Capturing

This chapter describes how to run/stop capturing signals.

Single Run

Captures data for a single period.

Menu

Run/Stop → ▶ Single Run

Toolbar icon



Shortcut key

F5

Panel operation



Press the Start switch.

Capturing succeeded

Toolbar icon (go back to default)



Status bar (left bottom)

End !!!

Capturing failed

Toolbar icon



Status bar (left bottom)

Waiting.

Continuous Run

Continuously captures data. Once the memory becomes full, GLA dumps the waveform data on the display, then restart capturing. This process is repeated until the Stop command (see next page) is issued.

Menu

Run/Stop → ▶▶ Repetitive Run

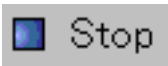
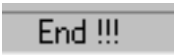
Toolbar icon



Shortcut key	F6
Capturing succeeding	Status bar (bottom left) keeps updating the amount of captured data in reference to the memory. 
Capturing failed	Status bar (bottom left) stays in the waiting mode. 
	Data is not captured while GLA is dumping stored waveform data on the display.

Stop Running

Stops capturing data.

Menu	 → 	
Toolbar icon		
Shortcut key	F7	
Capturing stopped	Toolbar icon (go back to default) 	Status bar (left bottom) 

Data Operation

Once GLA captures the data, several operations become available. This chapter describes how to search, view, and analyze the captured data effectively.

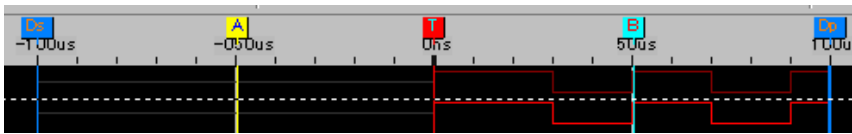
Data bar operation	Activate data bar	77
	Add/Delete data bar	78
	Move data bar	79
Waveform position	Waveform Position	81
	Move the cursor up/down	82
Data search	Data Search.....	83
	Data Search Step.....	83
	Bus search step.....	85
Zoom	Zoom In/Out.....	87
	Enclose (flexible ratio zoom)	88
	Show all data.....	88
	Manual Display/Analysis Range Setting	89
I ² C bus analysis	I ² C Bus Analysis	90
	Analysis step	91
RS-232 signal analysis	RS-232C Signal Analysis	94
	Analysis step	95
Waveform statistics	Waveform Statistics.....	97
	Statistics setup step.....	97

Data Bar Operation

Data bar shows the signal position which can be used as a place marker. Using the data bar, you can measure relative time, frequency, and points between data.

Activate data bar

Default state Five data bars are available by default: From left, Ds (start range) A, T (trigger), B, and Dp (end range).



Unit Data bar unit is selectable from address point, time, and frequency. Press the toolbar icon to select. For unit selection details, see page65.

Address mode	Time mode	Frequency mode
A - T = 15	A - T = 150ns	A - T = 6.667MHz

Position The positions of the bars are shown on the toolbar.

A Pos:-15

B Pos:15

Click the arrow to select the displayed bar.



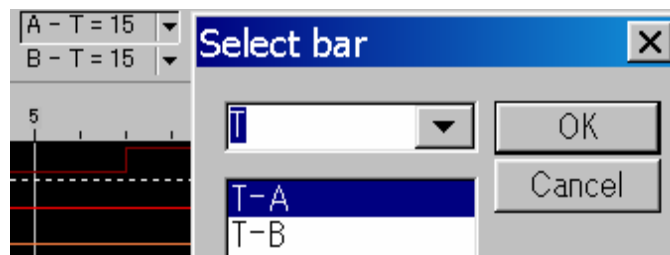
Relative distance The distance between each bar is also shown on the toolbar.

A - T = 15

B - T = 15

A - B = 30

Click the arrow icon  to select the displayed distance.



Add/Delete data bar

Add a bar

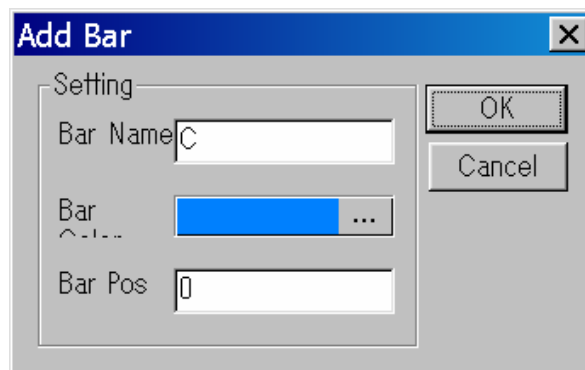
Menu



Toolbar icon



Dialogue window



You can specify the bar color and position.

Delete a bar

Menu



Toolbar icon



Dialogue window



Select the added bar and delete it.

Note: The default bars (T, A, B, Ds, Dp bar) cannot be deleted.

Move data bar

Move a bar manually

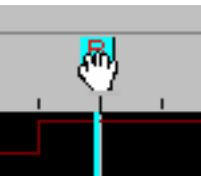
Toolbar icon



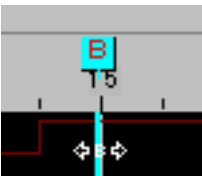
Move the bars manually using the mouse. Point the arrow close to the bar until it changes into Hand shape or double arrow. Move the bar right or left.

Note: The T bar position is fixed to the center.

Hand



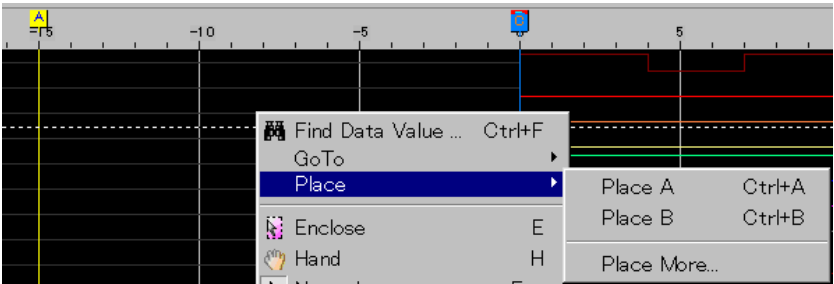
Double arrow



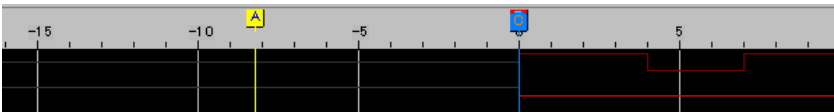
Move a bar to the pointed location

You can move a bar to the exact location that you point in the display.

Right-click the location you want to move the bar, in the display. Select Place from the context menu.



The target bar (in this case, A bar) moves to the click location.



For moving bars other than A or B, select the

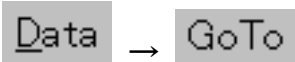
Place More...

Note: The T bar position is fixed.

Move a bar to the display center

Move the bars to the center position of the display instantly.

Menu



Toolbar icon



(T bar)



(B bar)



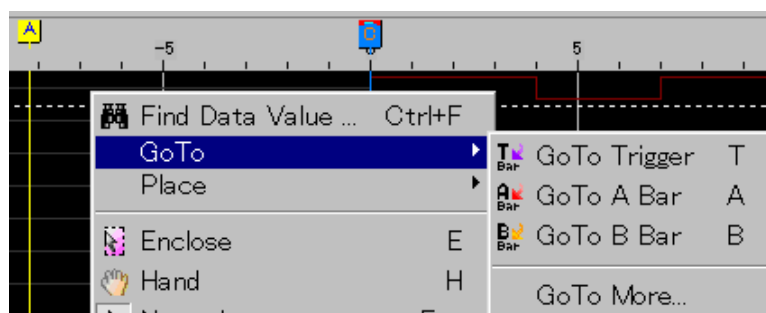
(A bar)

Shortcut key

T (T bar)/ A (A bar)/ B (B bar)

Context menu

Right-click on the display and select Go to.



Automatically
adjust bar

position to signal
edge

When this option is enabled, the bars automatically moves to signal edges when there are close.

Menu



Check the Auto-Close radio.



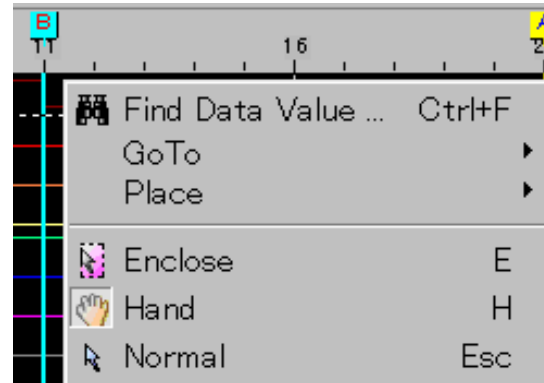
Waveform Position

Here we describe how to move the whole waveform display together.

Move the previous edge to the center	Search the previous data edge of the selected signal, move it to the display center.	
	Menu	
	Icon	
	Shortcut key	F11
Move the next edge to the center	Search the next data edge of the selected signal, move it to the display center.	
	Menu	
	Icon	
	Shortcut key	F12
Move the display left-right manually	Move the display area left or right manually. The mouse arrow changes into Hand style, allowing direct manipulation of waveform positions.	
	Menu	
	Icon	
	Shortcut key	H

Context menu

Right-click on the display area and select Hand.



Move the cursor up/down

Menu

Bus/Signal



Format Row



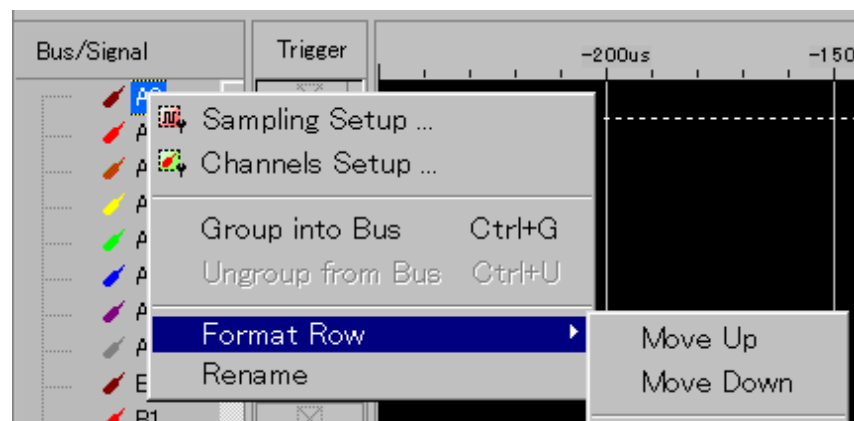
Move Up
Move Down

Shortcut key

Up/Down

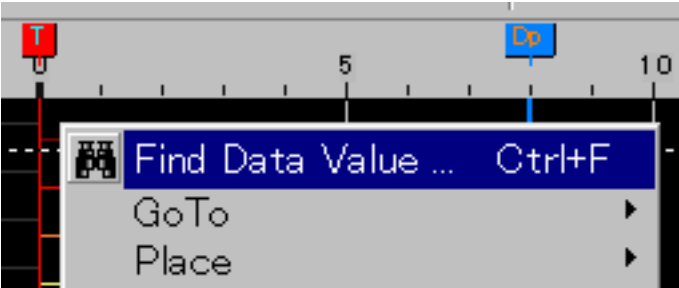
Context menu

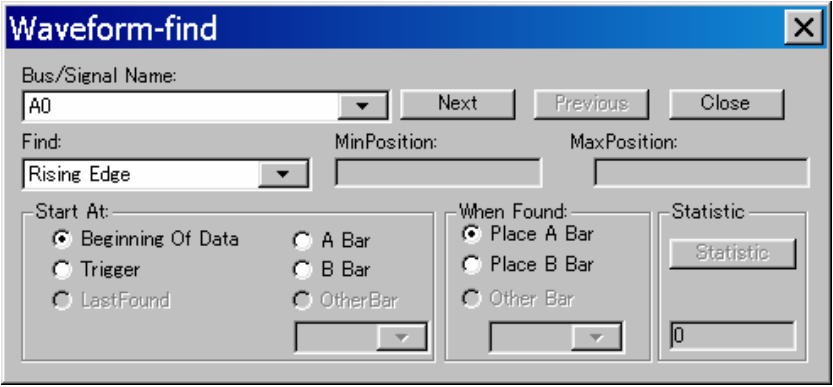
Right-click on the Bus/Signal list, select Format Row menu.



Data Search

Search data in the waveform and move the data bars.

Menu	Data →  Find Data Value ...
Icon	
Shortcut key	Ctrl+F
Context menu	Right-click on the display and select Find Data Value. 

Dialogue window	
-----------------	---

Data Search Step	1. Select the signal. Bus/Signal Name: A0
	2. Select the signal condition. Find: High Rising Edge Falling Edge Either Edge High Low Rising Edge  Falling Edge  Either Edge 



3. Select the search start position.

Start At:

☐ Beginning Of Data

☐ A Bar

☐ Trigger

☐ B Bar

☒ LastFound

☐ OtherBar

Address: 12

C

▼

Beginning	The beginning of the captured data.
Trigger	Where the trigger condition occurred.
Last Found	Where the last data search ended (available after at least one data search).
A Bar	A Bar position.
B Bar	B Bar position.
Other Bar	The bar other than A or B. Click  Bar Toolbar icon for adding a new Bar. For more details, see page43.

4. Select which bar to place when the target data is found.

When Found:

☐ Place A Bar

☐ Place B Bar

☒ Other Bar

C

▼

5. Search the data. Press Next or Previous, to search forward or backward in the waveform.

Next

Previous

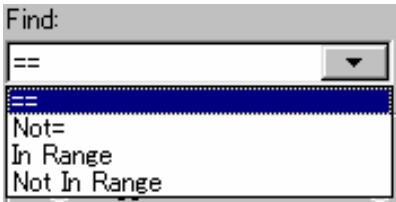
Bus search step

1. Select the Bus.

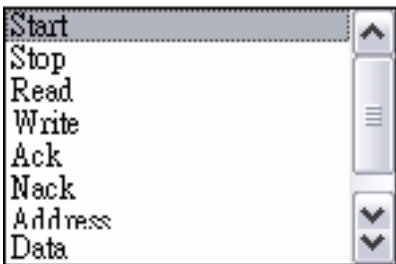


2. Select the Bus condition.

Normal Bus



I²C Bus

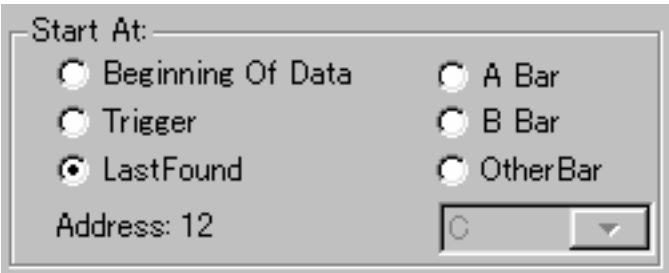


3. Set the Bus value range.
Enter the value directly
into Minimum and
Maximum column.



==	Search the Bus condition where its value equals the MinPosition value.
Not=	Search the Bus condition where its value is NOT equal to the MinPosition value.
In Range	Search the Bus condition where its value is within the Min/Max Position range.
Not In Range	Search the Bus condition where its value is outside the Min/Max Position range.

4. Select the search start position.



Beginning	The beginning of the captured data.
-----------	-------------------------------------

Trigger	Where the trigger condition occurred.
Last Found	Where the last data search ended (available after at least one data search).
A Bar	A Bar position.
B Bar	B Bar position.
Other Bar	The bar other than A or B. Click  Toolbar icon for adding a new Bar. For more details, see page78.

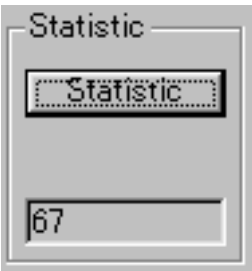
5. Select which bar to place when the target data is found.



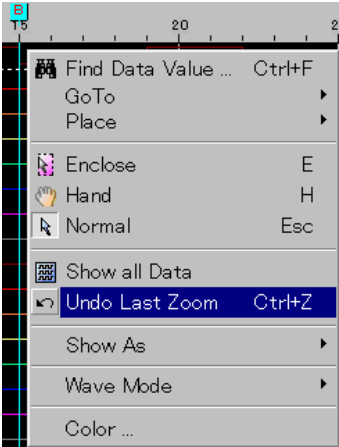
6. Search the data. Click Next or Previous, to search forward or backward in the waveform.



7. To see the total number of data match, click the statistic button.



Zoom In/Out

Zoom in	Menu	
	Toolbar icon	
	Shortcut key	F9
	Zoom ratio	x2
Zoom out	Menu	
	Toolbar icon	
	Shortcut key	F8
	Zoom ratio	÷2
Undo the last zoom	Menu	
	Shortcut key	Ctrl+Z
	Context menu	
	Right-click on the signal display and select Undo Last Zoom.	

Enclose (flexible ratio zoom)

Enclose function zooms the selected area into full screen horizontal size. When selected, the mouse arrow changes into a cropping tool to select the zoom range.

Menu



Icon

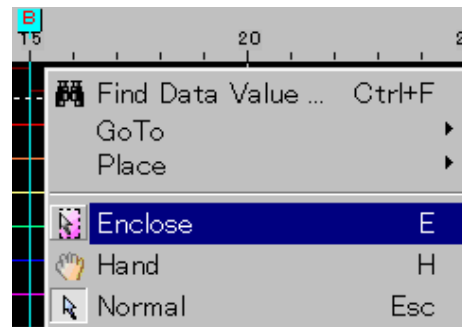


Shortcut key

E

Context menu

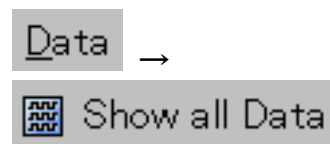
Right-click on the signal display and select Enclose.



Show all data

Squeeze and show all the captured data into a single screen.

Menu

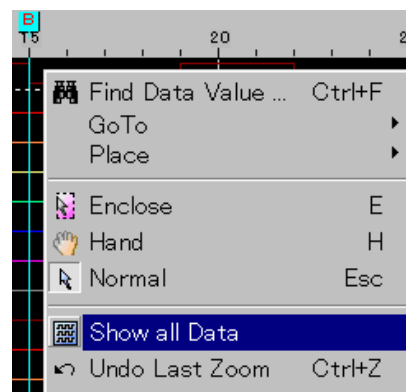


Icon



Context menu

Right-click on the signal display and select Show all Data.



Manual Display/Analysis Range Setting

You can set the display range manually, OR

You can limit the range of data for I2C (page90), or RS-232 (page94), or Waveform statistics (page97) analysis, to delete unnecessary chunk of data.

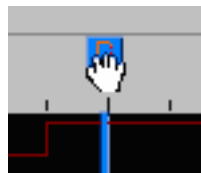
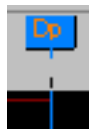
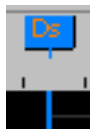
Menu

Data → Select a Analytic Range

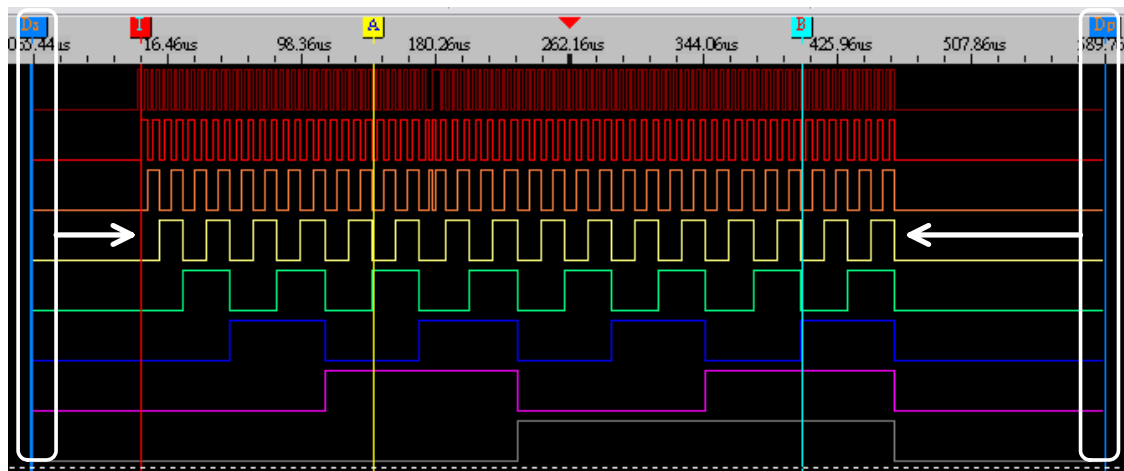
Selection step

The pointer changes into a hand tool. Grab the Ds (Start point) and Dp (End point) bar and move it manually or press the toolbar icon to adjust the displayed range automatically.

Start point End point Manual setting Automatic setting



Example

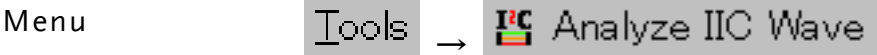
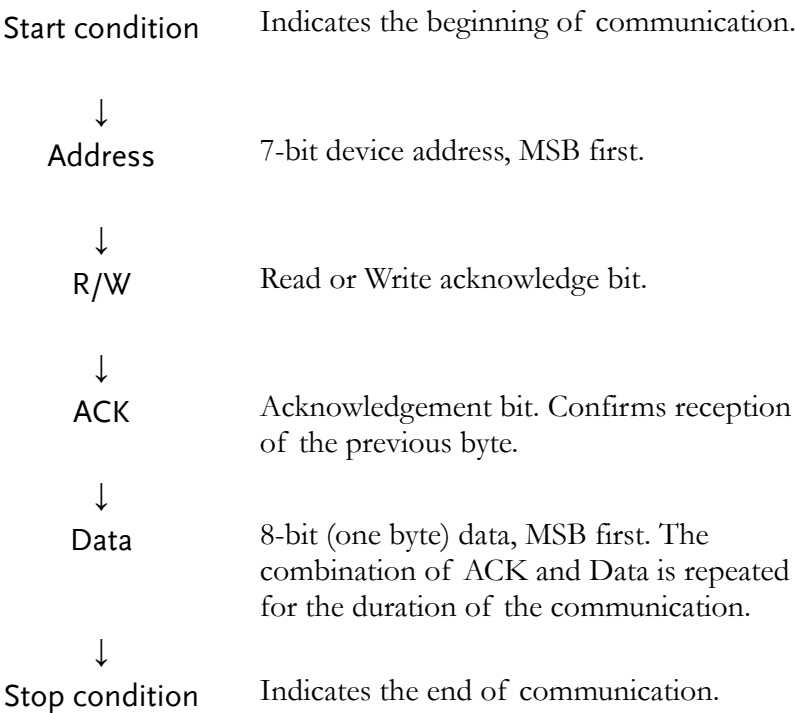


I²C Bus Analysis

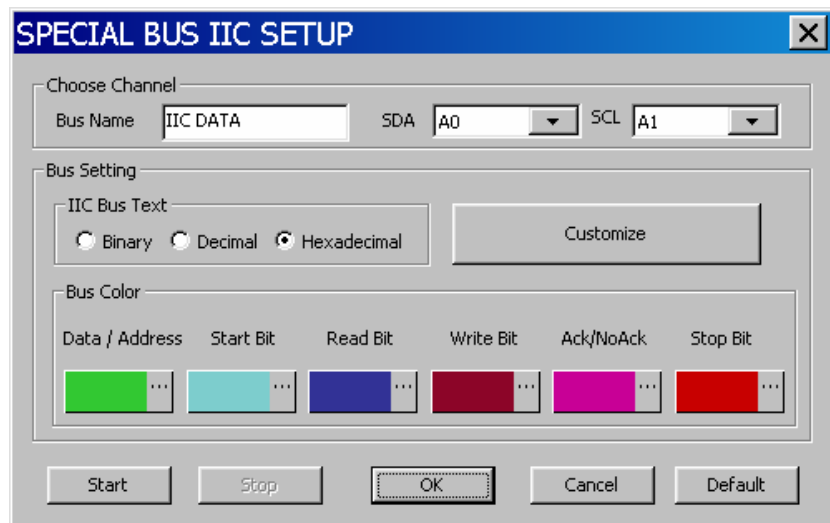
Background This function analyzes the widely popular I²C (Inter-Integrated Circuit) bus protocol by extracting the attributes from the captured data.

The bus consists of two lines, SDA (Serial Data Line) and SCL (Serial Clock Line).

The Data consists of the following elements.



Dialogue window



Analysis step

1. Limit the analysis range if necessary. Select "Select Analytic Range" from the Data menu. Limit the analysis range by



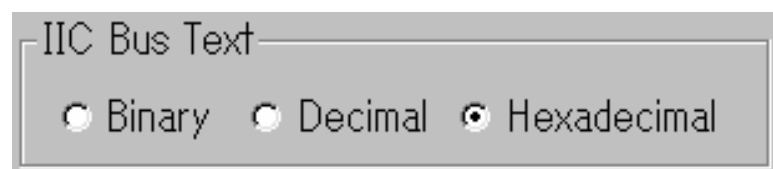
2. Enter the name of the new I²C Bus, created upon analysis



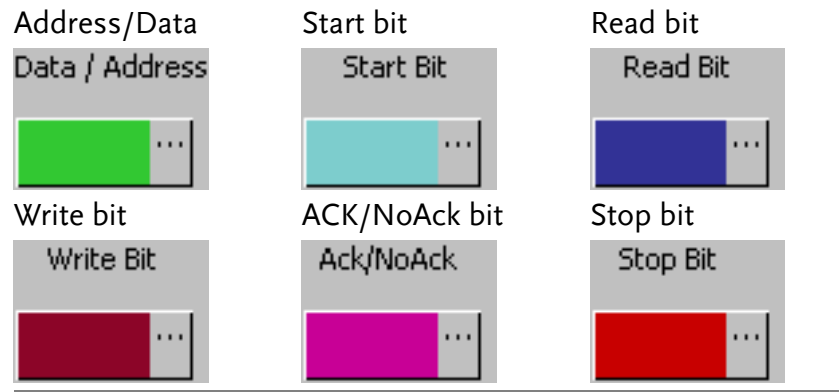
3. Select the SDA (Serial Data Line) and SCL (Serial Clock Line) channel.



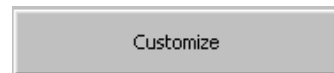
4. Select how the I2C Bus value will be displayed: Binary, Decimal, or Hexadecimal.



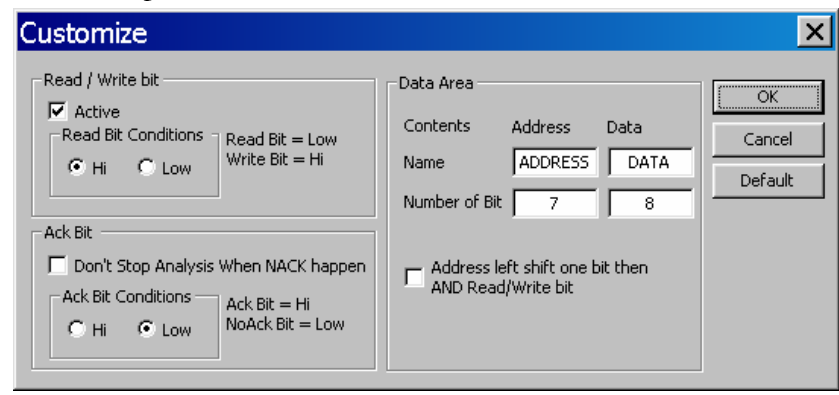
5. Select the color of the new I²C analysis Bus. Click each bus element's color bar and select a new color from color chart.



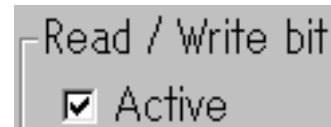
- Click the I2C Customize button



and open the Customize window.



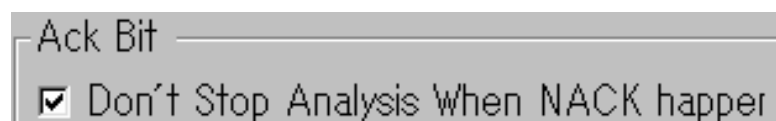
- Select the Read/Write bit activation and polarity. Click the Active radio button and activate or deactivate Read/Write bit.



- In active mode, click the Read Bit Conditions radio button and select the polarity. The Write Bit gets the opposite polarity.



- Select whether the NACK (Non-acknowledge) sign stops I²C analysis or not.



10. Select the ACK bit polarity.
NoACK bit gets the opposite polarity.

Ack Bit Conditions

☐ Hi ☒ Low

11. Enter the Data/Address display name and their bit length.

Contents	Address	Data
Name	ADDRESS	DATA
Number of Bit	7	8

12. Address can be shifted one bit left and then ANDed with Read/Write bit.

☐ Address left shift one bit then AND Read/Write bit

13. Press OK, Cancel, or Default.
Default contents:
Read/Write active
Read Bit High
Stop analysis upon NACK
Ack Bit Low
Address 7 bit/Data 8 bit
No Address shift

OK

Cancel

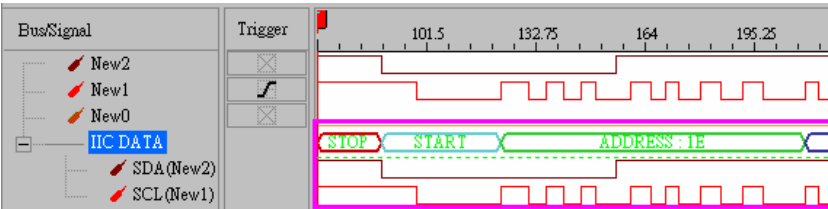
Default

14. Start/Stop I²C analysis.

Start

Stop

A new I2C bus will be created with the result shown as configured.



RS-232C Signal Analysis

Background

This function analyzes the RS-232C signal protocol by extracting the attributes from the captured data.

RS-232C consists of a single line, including the following elements.

Start bit	A single bit which indicates the beginning of data packet.
↓	
Data	4 to 8 bits data contents.
↓	
Parity bit	A single bit for detecting error: the number of 1s in the data, including parity bit, is always odd or even.
↓	
Stop bit	A single bit which indicates the end of data packet.

The other elements include:

Baud Rate	The transmission speed: 300 ~ 115200 bit/s.
Direction	The data order: MSB or LSB first.

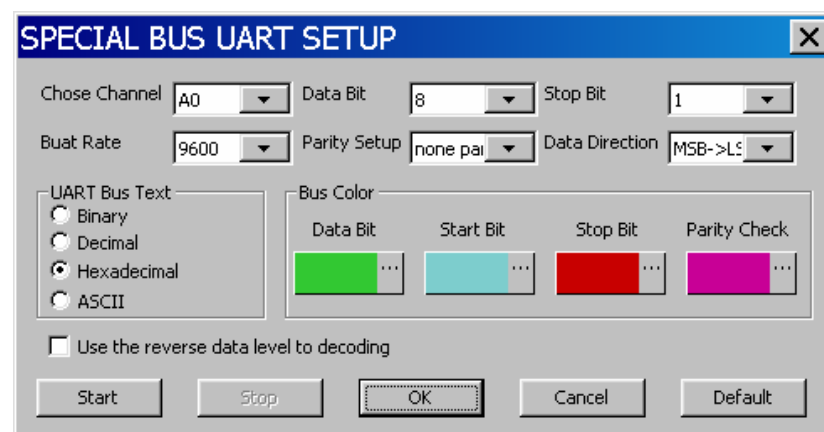
Menu



Icon

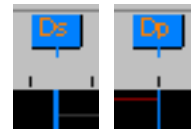


Dialogue window



Analysis step

1. Limit the analysis range if necessary. Select “Select Analytic Range” from the Data menu. Move Ds and Dp bar and limit the range. For details, see page89.



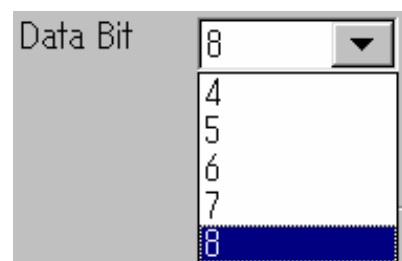
2. Select the signal channel.



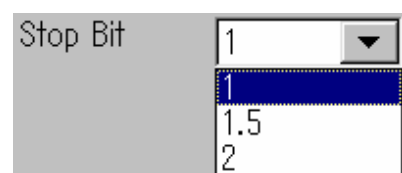
3. Select the Baud rate.



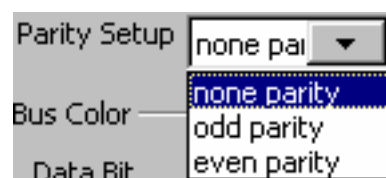
4. Select the Data Bit: 4 ~ 8.



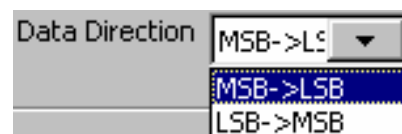
5. Select the Stop Bit width: 1, 1.5, 2.



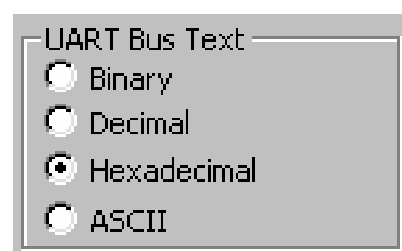
6. Select the Parity: none, odd, even.



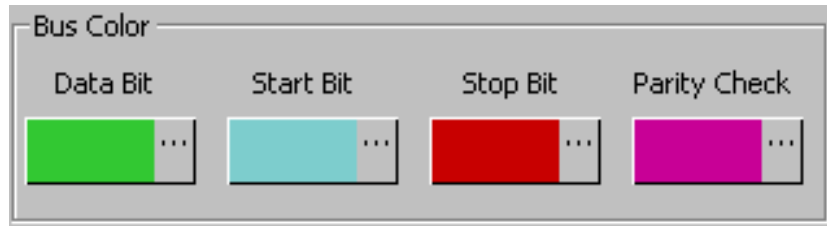
7. Select the Data direction: MSB first, or LSB first.



8. Select how the data value is displayed in the analysis result: binary, decimal, hexadecimal, or ASCII text.



9. Select the color of the RS-232 analysis result. Click each element's color bar and select a new color from color chart.



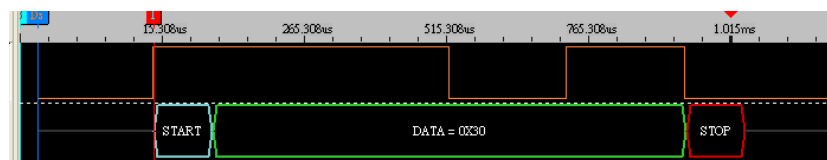
10. If the reversed polarity data should be used, click the radio.

☐ Use the reverse data level to decoding

11. Start/Stop RS-232 analysis.



The result is displayed as configured.



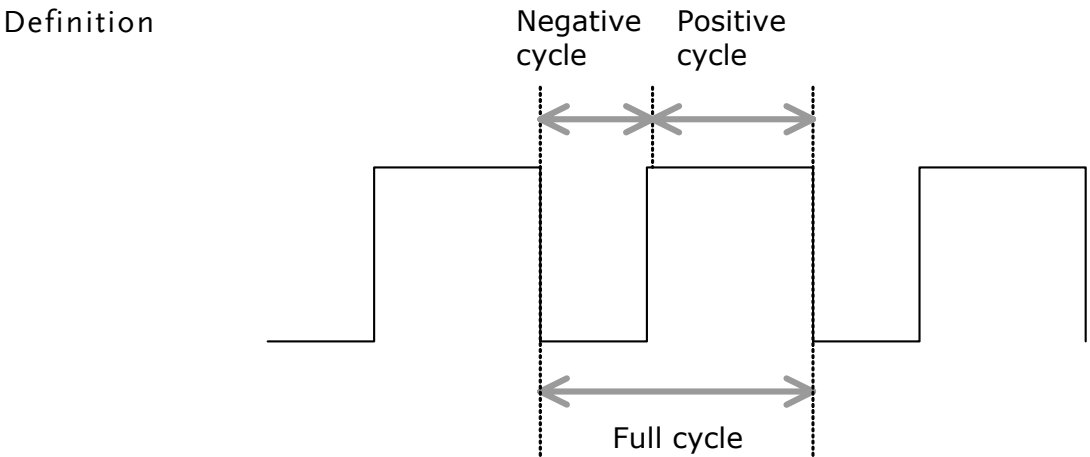
Waveform Statistics

The Statistics function shows the number of cycles included in the waveform. Cycle period and waveform range are configurable.

Toolbar icon 

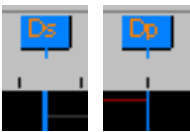
Dialogue window The statistics window appears at the bottom of the display.

Channel Option	Item Option	Condition Option	Warning Option	Refresh	☐ Filter	
CHANNEL	Integrated ...	Positive per ...	Negative p...	Eligible inte...	Eligible posi...	Eligible neg...
A0	3	3	3	0	0	0
A1	3	3	3	0	0	0
A2	0	0	1	0	0	0
A3	0	0	1	0	0	0
A4	0	0	1	0	0	0
--	-	-	-	-	-	-



Statistics setup step

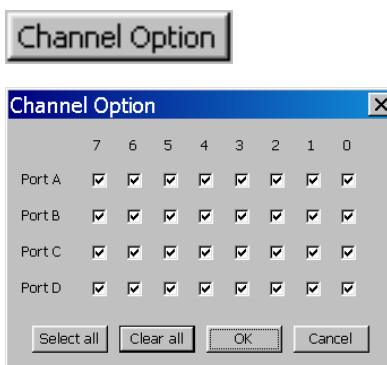
1. Limit the analysis range if necessary. Select “Select Analytic Range” from the Data menu. Move Ds and Dp bar and limit the range. For details, see page89.



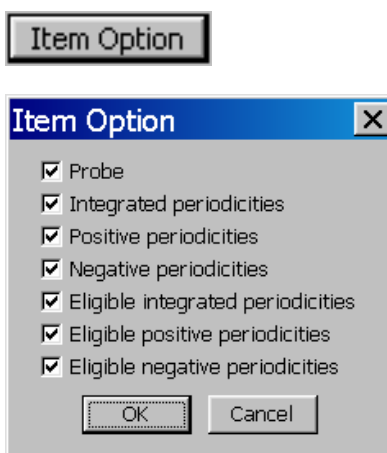
2. Press the Statistics icon. The statistics window appears.



3. Select the target channel if necessary. Press the Channel Option button. The option window opens. Check or uncheck the signals.



4. Select the included item. Press the Item Option button. The Item selection window appears. Check (uncheck) items to be included (excluded) in the statistics window.



Probe	The probe name for each signal.
Integrated periodicities	The number of full cycles included in the waveform.
Positive periodicities	The number of positive cycles included in the waveform.
Negative periodicities	The number of negative cycles included in the waveform.
Eligible integrated periodicities	The number of full cycles included in the waveform, which meet the conditions (see below).
Eligible positive periodicities	The number of full cycles included in the waveform, which meet the conditions (see below).
Eligible negative periodicities	The number of full cycles included in the waveform, which meet the conditions (see below).

5. Set the cycle period condition, if necessary. Press the Condition Option button. The conditions window opens. Make sure the radio is checked.

Condition Option

Conditions Option

☒ Start conditions setting

Eligible integrated periodicities

20us<= Time <=20us

Eligible positive periodicities

10us<= Time <=10us

Eligible negative periodicities

10us<= Time <=10us

OK

Cancel

	☒ Start conditions setting
Eligible integrated periodicities	Full cycle period, in ns/us/ms/s. GLA counts the number of full cycle that has the same period.
Eligible positive periodicities	Positive cycle period, in ns/us/ms/s. GLA counts the number of positive cycle that has the same period.
Eligible negative periodicities	Negative cycle period, in ns/us/ms/s. GLA counts the number of negative cycle that has the same period.

6. Check the Filter radio to filter out incomplete data.

☐ Filter

7. Press the Refresh button. The statistics windows updates the result.

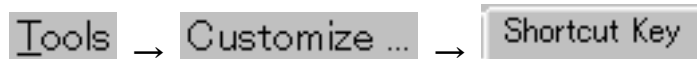
Refresh

System Setting

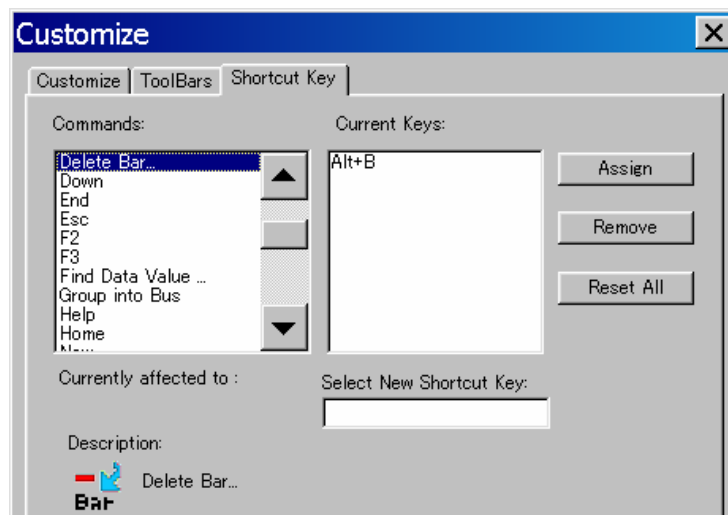
Keyboard Shortcut Setup

Shows the model name and software version. The default setting can be viewed from the setup dialogue window, or from Help menu → Keyboard Map, or this user manual page16.

Menu



Dialogue Window

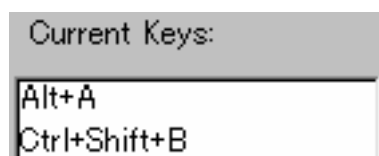
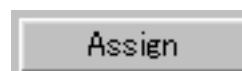


Assign a new shortcut

Click inside the New Shortcut key window and press the keys.



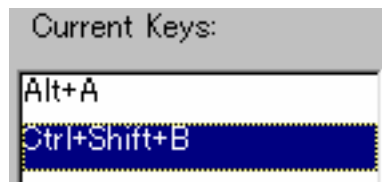
Click the Assign button.



The new shortcut is added to the list.

Remove a shortcut

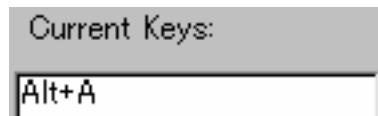
Select the target shortcut key inside the Current Keys window.



Click the Remove button.



The shortcut gets deleted.



Restore default

Click the Reset All button.



All shortcut keys settings goes back to the default state.

System Information

Version Information

Shows the model name and software version.

Menu **Help** → **? About GWINSTEK Logic Analyzer**

Dialogue Window



Automatic Software Update

GLA checks the software update at power up, then automatically installs the applicable files.

Menu Check On/Off the Update radio button.

Tools → **Customize ...** → ☒ **Check for Update**



Internet
connection

GLA checks the update information by accessing the server on the web. When there is no internet connection, a warning message will be generated.

Help Information

Main Help

Opens the main Help file, which includes this manual contents.

Menu 

Shortcut key F1

Keyboard Shortcut

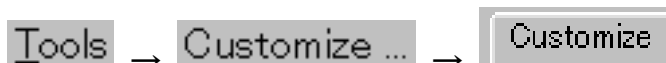
Opens the keyboard shortcut file.

Menu 

Tooltip

Shows/hides popup window for showing brief descriptions when the mouse scrolls over toolbar icons and waveforms.

Menu Check On/Off the Show Tooltip radio button.



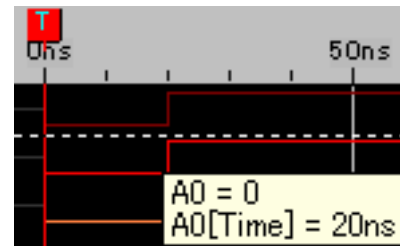
Dialogue window



Example

Toolbar (I²C setup)

Waveform



The tooltip on the status bar (the bottom left side of the display) is always On.

FAQ

The USB is slow, though the PC is USB 2.0 compatible.

Make sure the cable is compatible with 2.0 high speed (use the attached one).

The message “Hardware connection failed” pops up.

Make sure GLA is powered up and pressing the Retry button.

Disconnect/reconnect USB cable.

Do not use extension cable for USB. Make sure GLA and PC are connected by a single USB cable.

GLA does not capture signal, or the result is inaccurate.

Check all signal connections, including the ground terminal, are secure. Use both 2 GND cables for stable ground connection. Make the distance between GLA and device under test as short as possible.

The sampling rate has to be more than four times that of the signal frequency.

Regarding trigger: Make sure the trigger threshold matches the signal settings. Trigger counter and trigger page should not be too large.

If the external clock is used, the clock rate might be too low, especially if the internal clock captures signals.

A large portion of the input signal is irrelevant and consumes memory.

Use the Enable function to set a specific signal condition that triggers data capturing. In this way, you will not waste too much memory for irrelevant data. See page57 for details.

A large amount of data (more than 32Mbit) is required.

Use the Data compression feature. It uses lossless compression technique so there will be no data loss. See page42 for details.

Trigger condition does not occur.

Make sure trigger threshold matches signal setting. If the trigger condition is too complex, simplify the setting to make it easier for data capturing.

Sampling frequency of the input signal is very low.

Try using the external clock so that the acquiring period is extended. Here is the frequency range for internal and external clock.

Internal: 100Hz ~ 200MHz

External: 0.001Hz ~ 150MHz

If there is still a problem, please contact your local dealer or GWInstek at www.gwinstek.com.tw / marketing@goodwill.com.tw.

Specification

The specifications apply under the following conditions: GLA is powered on for at least 30 minutes, within +20°C~+30°C.

		GLA-1016	GLA-1032	GLA-1132
Channels		16	32	32
Memory Total/Per Channel		4Mbits/ 256kbits	4Mbits/ 128kbits	32Mbits/ 1Mbits
Interface		USB 2.0(1.1)		
Operating System		Win98/ 98SE /Me /2000 /XP		
Time Analysis		Maximum 200MHz		
State Analysis		0.001Hz ~ 100MHz		
Trigger	Channel	16	32	32
	Condition	Edge/Pattern		
	Pre/Post trigger	0% ~ 100%		
	Level	1		
	Threshold	+6V ~ -6V		
	Accuracy	±93mV		
	Count	1 ~ 65535		
	Page	Maximum 8191		
Input	Maximum Input Voltage	±30V		
	Impedance	500kΩ/10pF		

Specification (cont.)

The specifications apply under the following conditions: GLA is powered on for at least 30 minutes, within +20°C~+30°C.

		GLA-1016	GLA-1032	GLA-1132
Enable	Channel	16	32	32
	Enable Condition	Don't care, Low, High		
	Enable Delay	1 ~ 65535ms		
Data	Skew	<1.5ns		
	Compression Channels	16	24	24
	Compression Ratio	Maximum 255		
	Signal Statistics	Positive/ Negative, Full cycle within length condition		
	Protocol Analyzer	I2C, RS-232C		
Current Consumption	Static	Maximum 200mA		
	Working	Maximum 400mA		
Power dissipation	Static	Maximum 1W		
	Working	Maximum 2W		
Power	Interface	USB		
	Working voltage	4.5V ~ 5.5V		
Temperature	Operating	0°C ~ 50°C		
	Storage	-40°C ~ 80°C		
Dimension		102D × 39H × 137W(mm)		
Weight		Approx. 340g		

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