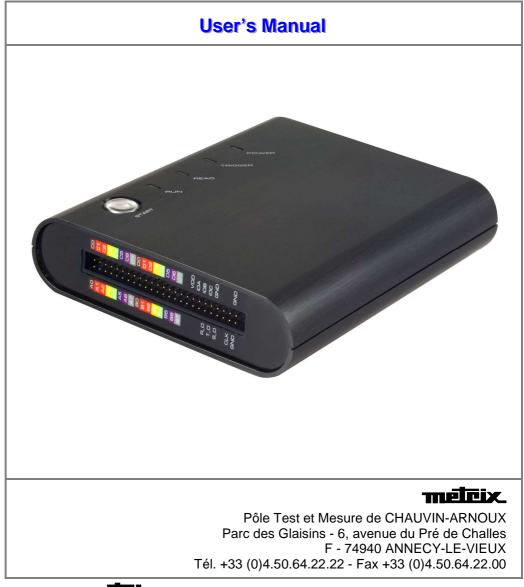


Logic Analyzer LX 1600



Copyright ©

X04125A02 - Ed. 01 - 03/14

Contents

General Instructions		Chapter I
	Introduction	4
	Precautions and safety measures	
	Symbols used	
	Warranty	
	Maintenance and metrological verification	
	Cleaning	
Description of the Instrument		Chapter II
	General view	6
	Connection	
	Front view	
	View of the card	
	System requirements	
	Software installation	
	Tips and advice	13
Getting started		Chapter III
	Software interface	14
	Hardware installation	
Basic Layout		Chapter IV
	Software installation	9
Menus and Tool Bars		Chapter V
	1. File	
	2. Bus/signal	
	3. Trigger	
	4. Run/Stop	
	5. Data	
	6. Tools	
	7. Window	
	8. Help	58
User Interface		Chapter VI
	1. Find Data value	
	2. Statistics Features	
	3. Customize Interface	-
	4. Auto Save	
	5. Color Setting	
	6. Flow of Software Operation	
Introduction to Logic Analysis		Chapter VII
	1. Logic Analysis	
	2. Bus Logic Analysis	
	3. Plug Analysis	
	4. Bus Packet List	
	5. Bus Analysis	
	6. Compression	
	7. Signal Filter and Filter Delay	
	8. Noise Filter	
	9. Data Contrast	
	10. Refresh Protocol Analyzer	158
	11. Memory Analyzer	
	12. Multi-stacked Logic Analyzer Settings	

Contents (cont'd)

Technical Specifications		Chapter IX
	Characteristics	
General Specifications		Chapter IX
	Environment	
	Mains power supply	
	Electromagnetic compatibility	
Mechanical Specifications		Chapter X
	Casing	
	Casing Packaging	
Supply		Chapter XI
	Accessories	



To update the embedded software, log on to the Internet site: <u>www.chauvin-arnoux.com</u>

Attention ! Before printing this notice, think of the impact on the environment.

General Instructions

Introduction

You have just acquired a Logic Analyzer, congratulations on your choice and thank you for your confidence in the quality of our products.

Precautions and safety measures

definition of CAT II: Test and measurement circuits directly connected to points of use *measurement* (power outlets and other similar points) on the low voltage network. *categories*



E.G.: Measurements on circuits on the household appliance, portable tool and other similar appliances network.

CAT III: Test and measurement circuits connected to the low voltage parts of the building network installation.

E.G. Measurements on distribution panels (including secondary meters), the circuit breakers, cabling including cables, busbars, junction boxes, circuit breakers, power outlets in the fixed installation, and the industrial use appliances and other equipment, such as motors permanently connected to the fixed installation

CAT IV: Test and measurement circuits connected to the source of the low voltage building network installation.

E.G.: Measurements on systems installed before the main fuse or the circuit breaker of the building's installation.

during use



Read carefully all the notes preceded by the symbol 2. The instrument power supply is equipped with an electronic protection system which is reset automatically when the fault is eliminated. Be sure not to obstruct the ventilation holes.

As a safety measure, use only suitable leads and accessories supplied with the instrument or approved by the manufacturer.

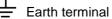
When the instrument is connected to the measurement circuits, never touch an unused terminal.

Symbols used

Warning: danger hazard, consult the operating instructions.



Selective sorting of waste for recycling electrical and electronic equipment. In compliance with the WEEE 2002/96/CE directive: must not be considered as household waste.





CE European compliance

General Instructions (cont'd)

Warranty

This equipment is warranted 1 year to be free of defects in materials or workmanship, in accordance with the general terms and conditions of sale.

During this period, the manufacturer only can repair the equipment. The manufacturer reserves the right to carry out repair or replacement of all or part of the equipment.

In the event that the equipment is returned to the manufacturer, initial transport costs shall be borne by the customer.

The warranty does not apply in the event of:

- improper use of the equipment or use in connection with incompatible equipment
- modification of the equipment without explicit authorization from the manufacturer's technical services
- · repair carried out by a person not certified by the manufacturer
- adaptation for a specific application, not included in the definition of the equipment or the user's manual
- an impact, a fall or a flooding.

Maintenance, Metrologic verification

The device includes no part that can be replaced by the operator. All operations must be carried out by competent approved personnel.

For checks and calibrations, contact one of our accredited metrology laboratories (information and contact details available on request), at our Chauvin Arnoux subsidiary or the branch in your country.

Cleaning

- Turn the instrument off.
- Clean it with a damp cloth and soap.
- Never use abrasive products or solvents.
- Allow to dry before any further use.

Description of the instrument

General View with simplified card

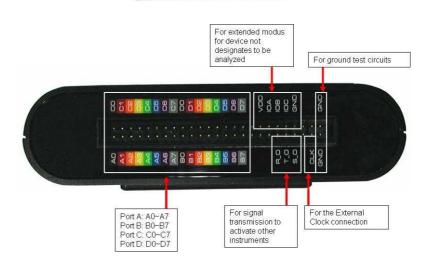


Connection

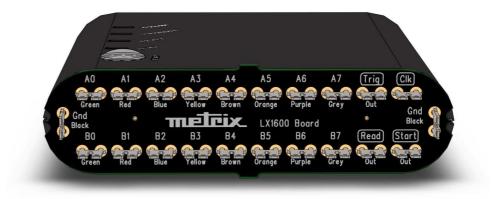
The power of the Logic Analyzer is powered by the USB connection.







View of the simplified card



Description of the instrument (cont'd)

List of functional pins

NA . 1 . 1 .	1 1 4 000
Models	LX 1600
Port A (A0~A7)	0
Port B (B0~B7)	0
Port C (C0~C7)	-
Port D (D0~D7)	-
R_O	0
Т_О	0
S_0	0
CLK	0
GND	0
VDD	0
IOA	0
IOB	0
IOC	0
GND	0

Definitions and functions of pins

CLK	Clock	For the External Clock connection.
GND	Ground	Two pins used for grounding the Logic Analyzer with Device Under Test(DUT).
R_O	Read (Out)	When the Logic Analyzer is about to upload data from memory to the PC, the R_O will send a Rising Edge signal of DC3.3V. When the upload is finished, a Falling Edge signal is sent.
Т_О	Trigger (Out)	When a trigger condition is established, the T_O will send a Rising Edge signal of DC3.3V. When memory is full, a Falling Edge signal is sent.
\$_0	Start (Out)	When a user initiates a sampling task by clicking the RUN icon in the window or clicking the START button on the device, the S_O will send a Rising Edge signal of DC3.3V. When the Logic Analyzer finishes uploading, a falling edge signal is sent.
VDD	Voltage Drain (Semiconductor)	Provides +3.3 V for external modules by draining voltage from the Logic Analyzer.
ΙΟΑ	Ext. I/O Module A	Transmits signals from an external module or device.
ЮВ	Ext. I/O Module B	Same as IOA.
IOC	Ext. I/O Module C	Same as IOA.
GND	Ground	Ground the external devices in sequence

Description of the instrument (cont'd)

System requirements

This section discusses basic operating system and hardware requirements for the Logic Analyzer. Software and hardware capabilities may vary depending on PC configuration, This manual assumes proper installation of a supported operating system as listed below.

Operating system In this sub-section, we share our experiences testing the Logic Analyzer requirements on the following Microsoft Windows operating systems. Since the Logic Analyzer requires operating system support of the USB protocol, Windows 95r2 and earlier OS versions are incompatible.

	Support	Non-support
Operating System	 Windows 2000 (Professional, Server Family) Windows XP (Home, Professional Editions 32-Bit version) Windows VISTA (32-Bit) Windows 7 (32-Bit and 64-Bit version) 	 Windows NT 4.0 (Workstation & Server, Service Pack 6) Windows Server 2003

Hardware System requirements

Hardware	Minimum	Recommended
CPU	166 MHz	900 MHz
Memory	64MB	256MB
Display Device VGA display capability with 1024X768 resolution or higher		VGA display capability with 1024X768 resolution or higher
Hard disk	at least 100 Mb available space	at least 100 Mb available space
USB	USB1.1 supported	USB2.0 recommended

Getting started

Software Installation

In this section, users will learn how to install the software interface and drivers. As with proper installation of many USB devices, the Logic Analyzer application and driver software must be installed prior to connection of the hardware. The following steps illustrate an installation of the Logic Analyzer. The other two models mentioned in Chapter 1 would follow identical procedures.

Step	Function
1.	Insert the driver CD-ROM in the PC CD drive.
2.	Execute the installation program. Go to the START menu, click START , Run , Browse in sequence, select Setup.exe file in the appropriate model folder and then click OK . It is recommended that all other programs are closed while the installation proceeds.
3.	Choose the Application Setup.
4.	Click Next to proceed with the Install Wizard.
5.	Select "I accept the terms of the license agreement", and click Next.
6.	Enter User and Company names.
7.	Choose the setup type. We recommend Complete for most users.
8.	Click Install to confirm settings and begin the actual installation.
9.	Click Finish to complete the installation.

Software Installation (contd).

You may launch « LOGIC ANALYZER » software, in two ways :

1. either from « Scopein@box » osilloscope, with the « LOGIC ANALYZER » key :

🚆 - MTX1054	4BW MTX1054	- Oscilloscop	e Control		
File Instrument	t Vertical Horiz	ontal Display I	Measure Tool	ls ?	
M 🛺 🖾 🛄		∰‡ Meas:CH1	J 🖽 🖻	a 🗙 💡	😵 🖳 문문 Ethernet
Vertical	@ CH1)	G CH2	С СНЗ	С СН4	Horizontal T/div
Probe	1.00	1.00	1.00	1.00	250ns
Volt/div	2.00V	5.00mV	50.0mV	50.0mV	H-pos Trigger (div)
Coupling	DC	AC	AC	AC	5.00
Position	-0.09 V	-3.18 mV	0.00 mV	Vm 00.0	Autoset
BWL	None	None	None	None	
V-Auto Range	Autoset	Autoset	Autoset	Autoset	CAPTURE
<u></u>		I			Logic Analyzer
Trigger Mode Auto	o Trigger	∄ Main	Trig	XY >>>	RUN / STOP
Source 👙 CH1	e 🛃	Ct LEV	/EL 50%	FFT >>>	
Level	0.00 V Filter	DC DC	>>> ·	mēlēix.	AUTOSET

2. or from the Scopein@box « Start » menu, select « LOGIC ANALYZER » icon:



Insert the CD	Start SCOPEin@BOX (from V. 2.03	3) installation and click " Next ".
Select your installation directory	SCOPEIn@BOX_ Destination Directory Select the primary installation directory.	METRIX - SCOPEin@BOX
	All software will be installed in the following lot different location(s), click the Browse button a Target directory for application C:\SCOPEin@80X Target directory for National Instruments sof C:\Program Files\National Instruments\	and select another directory. Browse
		<< Back Next >> Cancel
The installation	u SCOPEin@BOX.	
ends up	Installation Complete	METRIX - SCOPEin@BOX
	The installer has finished updating your system.	
		<< <u>B</u> ack <u>Next >></u> <u>C</u> ancel

Click « **Next** » to complete the installation and to start automatically SCOPEin@BOX.

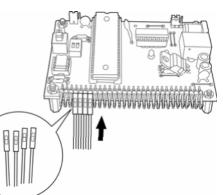
Hardware Installation

- **Connection** Hardware installation simply involves connecting the Logic Analyzer to your computer with the included USB cable.
 - Step 1 Plug the fixed end of the cables into the LA or on the supplied simplified card.



Step 2 Bus connection :

• Directly on the card : plug the loose ends into the connectors on the circuit board to be analyzed.



- The following sequence must be observed when connecting the connectors into the circuit board: A0 = Brown, A1 = Red, A2 = Orange, A3 = Yellow, A4 = Green, A5 = Blue, A6 = Purple and A7 = Gray.
 - On simplified card with supplied FASTON/BAN :





The circuit board must be grounded to the Logic Analyzer with the connecting cables (6 V max).

Step 3 Plug the square end of the USB cable into the Logic Analyzer.



Step 4



Plug the thin end into the computer.

- **Step 5** At this point, the computer should be able to detect the Logic Analyzer and finalize the installation for USB hardware connection. If not, seek driver USB manually.
- Step 6 Press « power ».
- Step 7 Open the page "Scopein@box" and click on "Logic Analyzer".

The data analysis of the probe is done exclusively with an oscilloscope of the Scopein@box type and uses its software. The software of the analyzer is in English, as well as the assistance and the delivered note .pdf.

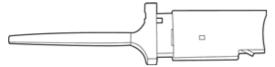
Product markings • Display LED : RUN

READ TRIGGER POWER

• START

```
Tips and advice
```

- 1. When testing a circuit board, make sure that the internal sampling frequency (within the Logic Analyzer) is at least four times higher than the external board frequency.
- 2. If the signal connector does not work well with the pins on the test board, try to use the supplied probes.



Probes Supplied with PC-Based Logic Analyzer



- 3. Usages of probes
- 3-1.Take the loose end of the cable and insert it into the clip.

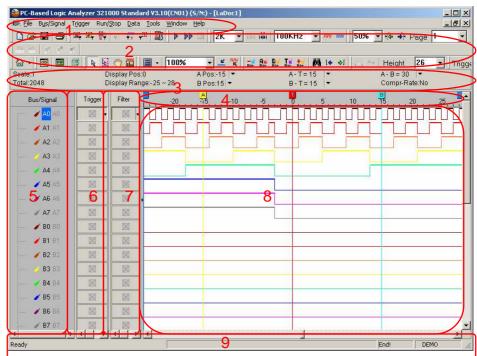


- 3-2.Compress the probe as shown to reveal two metal prongs.
- 3-3.Place the metal prongs on a metal connector on the testing board and release the fingers so that the prongs can grip the metal connector.
- 4. Unwanted signals can be filtered out using the **Signal Filter** or **Filter Delay** functions.
- 5. When measuring for a long period, **Compression** makes memory more efficient.
- 6. Trigger condition depends on the testing board. If triggering does not work well, try to narrow the trigger conditions and optimize them repeatedly.
- 7. If a testing board has a lower frequency than Logic Analyzer, sample signals according to the external clock.
- 8. When sampling from an external clock, filter extra signals with the Signal Filter function.
- 9. Unused channels may be removed from the Bus/Signal display using Bus/Signal (Menu) → Channels Setup.

Basic Layout

Software Interface

The layout of the Logic Analyzer software interface can be divided into nine sections as shown in the following figure.



- **1. Menu Bar** All operations are performed directly from the menu bar, including **configure label**, **rename**, **execute** and **stop**. Pull-down menus allow easy navigation through the measurement panel.
- **2. Tool Bar** The tool bar is the graphical user interface which can make you work with some of the more common applications. From these icons, you can change settings and operate the Logic Analyzer easily.

Note: The prompting information of the shortcut keys has been added in the tooltips of the Tool Bar, that is to say, when users place the cursor on the icons, the corresponding shortcut key information will appear. For example, the prompting information of the New button is "New (Ctrl+N)". "Ctrl+N" is the Shortcut Key of the function of New.

3. Information Bar The Information Bar displays information about the grids in the waveform, such as: Address, Time, Frequency, Trigger Bar, A Bar, B Bar and other Bar. Details of the labels are below:

Scale -	Define t	he acquisitio	n clock that	controls	the data	sampling
---------	----------	---------------	--------------	----------	----------	----------

- Total The period of time when Logic Analyzer captures data.
- Display Pos The middle tip means the middle position of the waveform.

Display Display the waveform time range of the current waveform display Range- area.

- A Pos The main function is to set A Bar or the other Bar.
- B Pos The main function is to set B Bar or the other Bar.
 - A-B Press the under arrow to exchange and become the other Bar Moreover, you also can execute this function from the other Bar.

Basic Layout (cont'd)

 4. Ruler Ruler shows the time position of the waveform shown in the waveform (Waveform Display / display area or the listing display area. Listing Display)

 5. Bus/Signal Edit names of the measured channels; color shown matches the trace (Waveform Display / color. Listing Display)

6. Trigger Column Trigger Column allows users to adjust signal trigger conditions.

7. Filter Column Filter Column allows users to set Bus or signal filter conditions.

8. Display Area Acquired data is displayed as a waveform or in a list format.

Waveform Display

This interface shows the digital signals. When the signal is logic "0", the waveform will be displayed as ____.

If the signal is logic "1", the waveform is as $\boxed{-}$. An unknown signal waveform is displayed in gray between the high and low levels as $\boxed{-}$. There are sixteen channels in 16064 and 16128, and thirty two channels in 32128, 321000 and 322000.

Listing Display

This interface shows the digital signals as 1 and 0. Logic 1 is displayed as "1" and logic 0 is displayed as "0".

9. Status Area Display the Logic Analyzer status. The function name is also indicated here.

Menus and Tool Bars

This chapter presents detailed information on the 8 menus and 13 tool items shown in the menu bar.

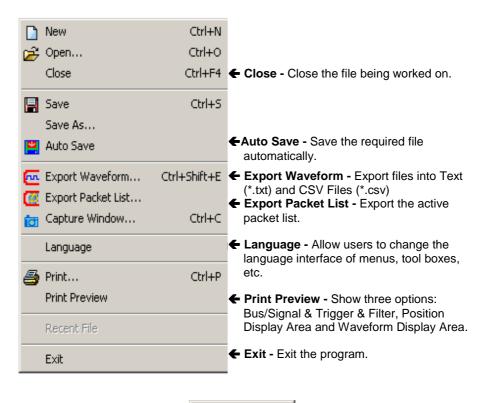
The eight menu items are:

- 1. File
- 2. Bus/Signal
- 3. Trigger
- 4. Run/Stop
- 5. Data, Tools
- 6. Window
- 7. Help

The fourteen tool items are:

- Standard
- Trigger
- Run/Stop
- Sampling
- Trigger Content Set
- Display Mode
- Windows
- Mouse Pattern
- Zoom
- Data
- Height
- Trigger Delay
- Font Size
- Data Contrast /Screen Display

1. File



Sta	ndar	ď	
	Z		3
_	_		

Standard Tool Bar.

Menu Item	Detail Menu & Dialog Box
New Ctrl+N	Open a new file.
je Open Ctrl+O	Deck Protocol Analyzer HDQ_v20700 Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image: Construct on the second analyzer Image:

Open an **existing** file.

	PC-Based Logic Analyzer 32120 Standard V3.10(CH01) (5/h) Ed View (bb
	🗅 😹 🖓 등 다 백 위 위 귀 표 >>> 🗷 2K - 의 배 100KHz
Close Ctrl+F4	
	Resty Endi DEMO

Close the active workspace.

	Save As				<u>?</u> ×
	Save in:	Desktop	1	· 🗕 🖶 🖬 🗸	
Save Ctrl+S	My Recent Documents Desktop My Documents	i Signal Folder			
	My Network	File <u>n</u> ame: Save as type:	LogicAnalyzer File(".als)		► Save Cancel
Save As	27500	Project	Author: SUNSHINE	_	
😭 Auto Save	Note:				*

Save As Dialog Box

Save – Save the current file.

Save As – Specify the name of the file to be saved. Auto Save – Save the required file automatically.

📶 Export Waveform.

Ctrl+Shift+E

Save in:	Desktop		• 🗧 🖶 💣 📰 •
My Recent Documents	Protocol Anal Signal Folder 111.txt ProtocolInfo.		
My Computer My Computer My Network Places	✓ File name: Save as type:	*.txt Text Files(*.txt)	▼ <u>S</u> av
Bus Output Para		nformation Style ALL	Bus Item
Perform Model		Model All Data	
C Horizontal			

Export Waveform Dialog Box

Export Waveform: Export a file into text (*.txt) or CSV (*.csv) formats.

Bus Output Parameter: Decide whether or not to display the parameters of the file to be exported.

Perform Model: Choose whether to export the data either vertical or horizontal.

Data Style: Include ALL, ALL BUS, PROTOCOL (HAS CHANNELS), PROTOCOL(NO CHANNELS).

Data Model: Export data changed function; the selected items include ALL Data, Sampling Changed Dot (Compression), Data Changed Dot (Compression). Some of the data value for the signal channels of sampling position are the same, for example, view the data changed and decrease export capacity; this function will be good for users.

Output Range: Choose the range of the data to export from the pull-down menus.

Pop up an export file automatically: The export file can be popped up automatically. Users can decide whether to activate the function; the default is selected. See the export file below:

📕 111.txt - Noter									_0;
Elle Edit Format	Alew Hel	D							
//			-	Thanks f	or using	PC-Base	d Logic Versi	Analyzer on:v3.10	
11			-						
//Filename: : //File size::									
// File creat									
// Logic Ana // Sampling r	lyzer se	tup infor	mation						
// Samping r // Internal :	node:Sta samnlind	indard i freduenc	v = 1000	00 HZ					
// RAM size -	= 2KB		, - 2000	00 112					
// None Use I // The number	Data Com	pression.							
// The number									
// Trigger P		s: Trique	r positi	on = 50%					
()	-	Trigger	level:	A F	ort = 1 .	50 V	B P	ort = 1.	50 V
C Port = 1.	. 50 V	Trigger	ort = 1.	50 V					
//		Tridder	page= 1						
// Signal Filter setup : Filter Condition lengthens or shortens: no									
Delay time: Disable // \"H\" stands for the signal of high pattern, \"L\" presents the signal of low									
pattern and \"X\" means don't care.									
// Signal Tr	igger se	tup : ∖"D	\" stand	s for do	n't care	, \"н\"	presents	high pa	ttern
and \"L\" mea	ans row	haccent.	" means	Rising E	idae. ∖"∈	\" prese	nts Fall	ing Edge	. \"F\"
stands for E									
// The displ	ay and t	rigger se	tup of B	us: Acco	rding th	e charac	ter of t	he origi	nal
file to pres // The displa	ent. av of me	ssage: To	tal: 204	8 Scale	1.000				
Keeping the :	settings	is essen	tial to	reproduc	e channe	ls and E	uses.		- 1
// Channel n		A0	A1	A2	A3	£4	A5	A6	Α7
BO B1	B2	83	B4	B5	B6	B7	ĉõ	C1	C2
C3 C4	C 5	C6	C7	DÖ	D1	D2	D3	D4	D.5
D6 D7 // Signal Fi	lter.	×	×	×	×	×	×	×	×
// signal Pi	icei.		^	<u> </u>	· ·	· ·	^	^	~

Export File

oprt Packet Lis	t				1
Save in:	🞯 Desktop		•	+ 🖹 💣 📰	-
My Recent Documents	 111.txt ProtocolInfo 	.bxt			
Desktop					
My Documents					
My Network Places	4				
	File <u>n</u> ame: Save as <u>type</u> :	Text Files(*.txt)		<u> </u>	<u>S</u> ave Cance
-Bus Output Para	meter Data	a Format	Export	: Format	
• Yes (`No	Hexadecimal	Repo	ort Form	Option
Output Range	First Packet	_	To Fin	al Packet	•
	0		0		

Export Packet List Dialog Box

Users can use paperwork, register and analyze packet list data.

Pop up an export file automatically: The function of popping up an export file automatically in the Export Packet List dialog box is the same with that of the Export Waveform dialog box.

Export Format: The Export Format is convenient for users to use the captured data in the following process. There are two formats for selecting, Report Form and Pure Data Form. See the following picture:

Bus Output Parameter Data Format Hexadecimal Output Range	Export Format Pure Data Form Pure Pure Pure Pure Pure Pure Pure Pure
From First Packet	To Final Packet
Pop up an export file automatically	

Export Format Pull-down Menu

In the part of the Export Format, when the users select the Report Form, the "Option" button can't be used; when users select the Pure Data Form, the "Option" button can be used. The "Option" pops up the Option dialog box as follows, where users can customize the export data items in the dialog box which are Packet #, Name, TimeStamp, Length and DESCRIBE.



Option Dialog Box

[Export Packet List...

📻 Capture Window	Ctrl+C

🔒 Capture Window			x
Capture to NC File Clipboard MsPaint Capture Region G Full Screen Select Region	ate:		
Select Line Colo		I Opposite of Color	
Ca	pture	Cancel	

Capture Window

This feature is equivalent to [Alt]+[Print Screen], or [Print Screen]

Capture to

File – Save the captured image as either a jpeg or bmp. Clipboard – Copy the captured image to the clipboard for use in other applications.

MsPaint - Directly start MsPaint to view the captured image.

Capture Region

Full Screen – Capture everything on the screen. Select Region – After pressing the capture button, a cross-hair will appear on the screen. Left click the mouse button to drag an area to capture.

Select Line Color

Click the color box to change the color.

Opposite of Color

Click this check box to ensure that the note text will be the opposite of the line color.

Color of the Note

Choose the color of the note text.

Note

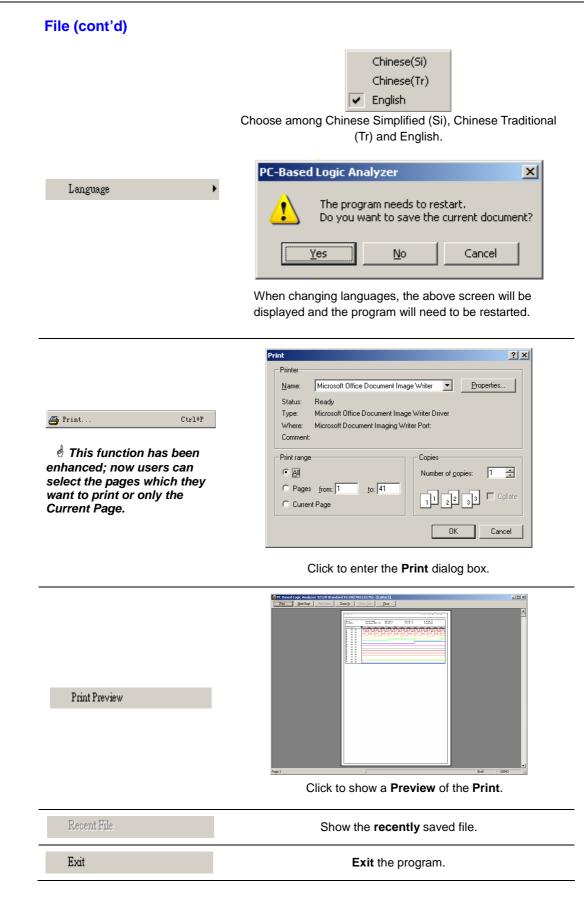
Type in a note to attach to the captured image.

Capture

Click the button to capture the image.

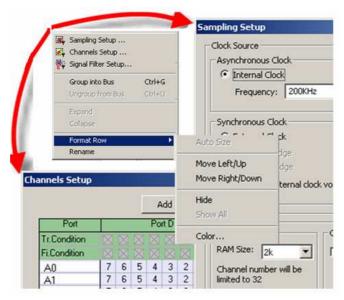
Cancel

Click Cancel to end the capture.



Menus and Tool Bars (cont'd)

2. Bus / Signal



Bus/Signal Menu. Dialog boxes of the Sampling Setup and Channels Setup are shown and indicated by arrows.



Trigger Tool Box

Menu Bar: Bus/Signal

	Menu Item	Detail Menu & Dialog Box
	Sampling Setup	Sampling Setup Image: Source Asynchronous Clock Image: Source Frequency: 200KHz Synchronous Clock External Clock External Clock Image: Source Synchronous Clock Image: Source External Clock Image: Source Synchronous Clock Image: Source Image: Source Image: Source Source Image: Source Image: Source Image: Source Apply OK Cancel Restore Defaults Help Image: Source Sampling Image: Source Image: Source Image: Source Apply OK Cancel Restore Defaults Help
Tip:		RAM Size
	Icon Description	Choose the RAM Size and the internal clock frequency
	RAM Size	from the pull-down menus.
	Increase RAM Size	
	Decrease Internal Clock Frequency	
	Increase Internal Clock Frequency	
RA	M Size	The amount of the acquired data that can be stored by the Logic Analyzer depends on the amount of the allocated RAM.
		The total depth of the memory for the PC-Based Logic Analyzer is 128K Bits in each probe.
		If the Logic Analyzer starts gathering data with a 128K memory range, it will take a long time to find the required information.
		In order to avoid spending a lot of time gathering data, select a smaller RAM Size. The RAM Size options are 2K, 16K, 32K, 64K, 128K and 256K. So, if gathering data with 128K takes a long time why does 256K make sense? The reason for this extra RAM Size is to cope with the fact that a few of the 1~16 channels may have a large data input.

Use the pull-down menu to choose the speed of the clock on the board being tested.

Tip:

Clock Source

	-		
Asynchronous Clock			
Internal Clock			
Frequency:	50KHz 💌		
	100Hz		
Synchronous Clock	500Hz		
C External Clock			
🕑 Rising Edg	25KHz		
🔿 Falling Ed			
Nebel The ever	200KHz		
Note: The exte			
	800KHz		
	1MHz		
Sampling	10MHz		
RAM Size	25MHz		
	50MHz		
RAM Size: 2k	80MHz		
,	100MHz		
Channel number w			
limited to 32	200MHz		

The sampling frequency should be more than four times higher than the signal to be measured so that the waveform duty cycle depiction will be accurate.

Synchronous Clock

Asynchronous Clock



Choose the frequency of the clock on the board of the Logic Analyzer. Select "External Clock" to acquire data through external sampling. Choose either "Rising Edge" or "Falling Edge" to execute the analysis process.

According to the users input the value of external frequency in software, the software can count the relevant value about signal mode and frequency. For example: the value of the message, the time scale and the zoom in and out will be the value of time mode.

Connecting the Synchronous Clock

Use one of the single connecting cables to put one end on the testing board and the other in the LA as shown in the diagram opposite.

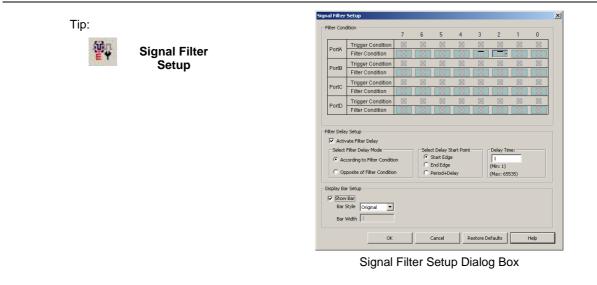




Check the box to compress all the data.

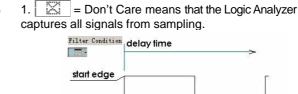
Compression is used to compress acquired data through a lossless compressor. The purpose of this compression is to place more data in a limited memory than in an actual memory. The compression rate of the Logic Analyzer can be up to 255 times. This means that the maximum acquisition can be 32M Bits (128Kx255= 32M Bits) for each channel. The chosen capacity of the memory, 1MB, means that the maximum data being sieved out arrives at 1MB*255=255M Bits (Per Channel).

It is the trace will change depending on the data being analyzed.



Select the Signal Filter Setup from the pull-down menu of the Bus/Signal or click the icon or the Button on the Sampling Setup dialog box to open the Signal Filter Setup dialog box.

d There are three modes of Signal Filter configuration for each channel. The function of Signal Filter is to use an alterable judgment circuit which can filter undesired signals in order to capture and store valuable data in the memory. When the combination of input signals from each channel meets the filter conditions, the section of acquired data will be gathered by the Logic Analyzer and stored in the memory. After storing the data, it will return to the Logic Analyzer's system and be displayed as a waveform. If the combination does not meet the filter conditions, it won't gather and store data.



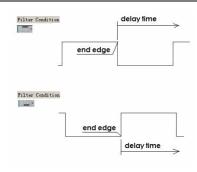
711 - C - 111			
Filter Conditio	a delay time		
<u>-</u>		ň.	
start edge			

High and Low Levels

It is the system default.

2. High Level means that the Logic Analyzer captures and displays the input signals satisfying the high level.

3. Low Level means that the Logic Analyzer captures and displays the input signals satisfying the low level.



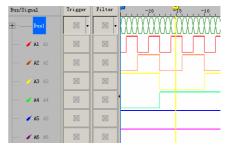
High and Low Levels

Signal Filter Delay Setup

Filter Delay – According to the filter condition.

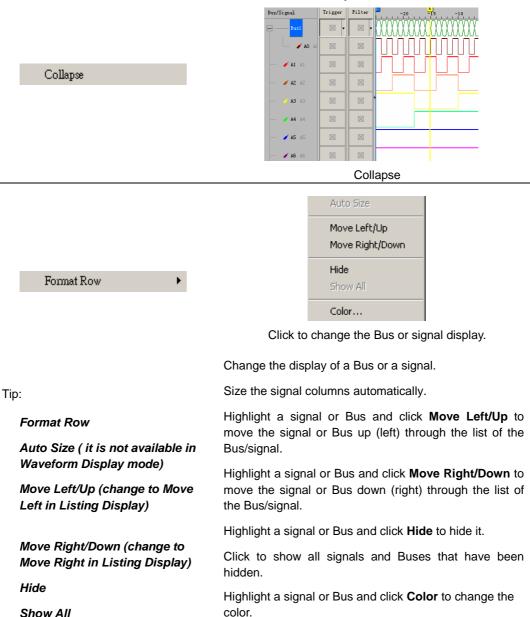
Start Edge – Show the waveform from the start edge to the delay time interval.

Channels Setup Tip: Channels Setup	Image: Setter of the set
	Click the Add Bus/Signal button to add a channel. This will appear as ' New0'.
	Click the Bus or channel you want to delete and press the Delete Bus/Signal button.
Tip:	Press the Delete All button to delete all the Buses and channels.
Add Bus/Signal Delete Bus/Signal	Press Restore Defaults to return all channels and Buses to the system defaults. Select this function when adding and deleting channels,
Delete All	the software reserves the original waveform; not select this function, the waveforms in channel are cleaned up.
Restore Defaults	
Group into Bus Ctrl+G	Signals can be grouped into Buses by pressing Ctrl + G .
Reserve waveform data and show them	Signals can be added, deleted ,copied and grouped into Bus, using the mouse or the keyboard, or right click and select the desired operations from the pull-down menu The movement of a signal channel are Auto Size (not available in waveform display), Move Left/Up, Move Right/Down, Hide, Show All and Color)
Ungroup from Bus Ctrl+U	Ungroup signals from Buses by pressing Ctrl + U .
Expand	A Bus contains at least 1 channel. In order to see these channels click the '+' symbol before the name of the Bus.



Expand

If the Bus has been expanded click the '-'symbol before the Bus name to **Collapse** the Bus.



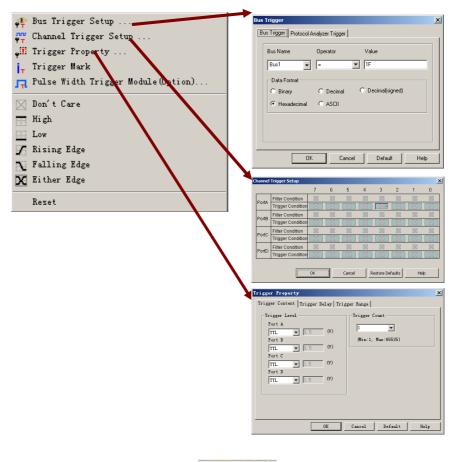
Color

Rename

Highlight a signal or Bus and click **Rename** to rename the Bus or signal.

Menus and Tool Bars (cont'd)

3. Trigger





Menu Bar: Trigger

Menu Item	Detail Menu & Dialog Box
φ <mark>₽</mark> Bus Trigger Setup	Bus Trigger Protocol Analyzer Trigger Bus Name Operator Value IF Data Format IF Data Format Decimal (signed) Image: Im
🛺 Channel Trigger Setup	Image: Condition 7 6 5 4 3 2 1 0 PortA Filter Condition 7 8 5 4 3 2 1 0 PortA Filter Condition 7 8 5 4 3 2 1 0 PortA Filter Condition 7 8 7 0 0 7 0 7 <td< th=""></td<>
_⊤ Trigger Mark	Open the Trigger Mark function.
Fulse Width Trigger Module (Option) Tip: It is an optional function. That is to say, this function can be used in the Modules, 16064, 16128, 32128 and 321000 after registering. And for the 322000, it is not necessary to register as it can be used for free.	Pulse Width Trigger Module: Set a trigger condition for a single channel, and the signal in this channel can be triggered in the predetermined range. However, this function is required to use with the hardware of the Pulse Width Trigger Module. (If you want to learn the detail, please refer to the Specification of the Pulse Width Trigger Module.)
🔀 Don't Care	Set the trigger condition as "Don't Care".
Hi gh	Set the trigger condition as "High".
Low	Set the trigger condition as " Low ".

🗾 Rising Edge	Set the trigger condition as " Rising Edge ".
N Falling Edge	Set the trigger condition as "Falling Edge".
🗙 Either Edge	Set the trigger condition as "Either Edge".
Reset	Reset the trigger condition.
Image: Trigger Property	Trigger Property X Trigger Content Trigger Delay Trigger Range Trigger Level Trigger Count Trigger Count Port A TTL 1.5 (V) Port B T55 (V) (Min:1, Max:65535) Port C TTL 1.5 (V) Port D TTL 1.5 (V) Port D TTL 1.5 (V) OK Cancel Default Help

Set Trigger Content

Trigger Level

The voltage level that a trigger source signal must reach before the trigger circuit initiates a sweep.

There are 4 ports available; each port has the ability to assign different voltages to meet the users' requirements.

Use the pull-down menu to choose between TTL (default TTL), CMOS (5V), CMOS (3.3V), ECL and User Defined (choose the value of the Trigger Level - 6.0V to 6.0 V).

50% 💌 🎋 🐳 Page	1 💌	Count	1 🔹
(1)	(2)		(3)

Trigger Position, Trigger Page, Trigger Count

- (1) represents the Trigger Position of a memory page.
- (2) represents the Trigger Page.
- (3) represents the Trigger Count.

Tip:

Trigger Content Setup

Icon	Description
÷.	Decrease trigger position
-	Increase trigger position
N/A	Trigger Page
N/A	Trigger Count

Trigger Delay	
Description	
Trigger Delay	

rigger Property Trigger Content Trigger Delay Trigger Ra	ange
© ∐rigger Page Trigger Page 1 (Mir: 1, Max 8192)	C Delay Time and Clock Trigger Delay Time TOus (Min:10us , Max:167.76191s)
Trigger Position	Trigger Delay Clock 1 (Min: 1, Max: 16776191)
T Pos = 0 , Start Pos = -1023 , End Pos Note: When more than one trigger page the view.	= 1025 is are selected, the trigger bar disappears from
ОК	Cancel Default Help

Set Trigger Delay

Trigger Delay	5us
---------------	-----

Set up Trigger Delay clock under time display.

Trigger Delay	1000
---------------	------

Set up Trigger Delay clock under sampling site display.

The **Trigger Delay** setting in **Tool Box** equals to that in the above dialog box.

:	
Tr	igger Range
lcon	Description
N/A	Trigger Range

Set Trigger Range

Menus and Tool Bars (cont'd)

4.Run / Stop



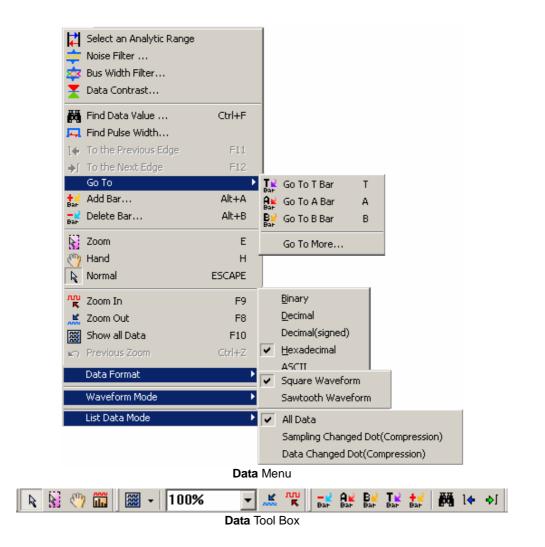
Run/Stop Tool Box

Menu Bar: Run/Stop

Menu Item	Detail Menu & Dialog Box
▶ Single Run F5	Click to run once.
▶▶ Repetitive Run F6	Click to run continuously until the Stop button is pressed.
Stop F7	Click to stop the repetitive run.

Menus and Tool Bars (cont'd)

5. Data



Menu Bar: Data

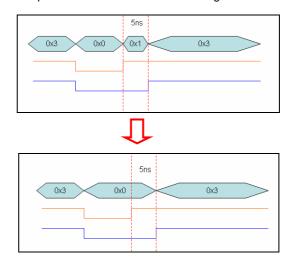
Menu Item	Detail Menu & Dialog Box
🔀 Select an Analytic Range	Check the box to enable the Analytic Range to be changed by dragging the Ds and Dp bars with the left mouse button.
	Noise Filter: It can filter 0~10 Clock's positive pulse width or negative pulse width signal.
noise Filter	Noise Filter: None
	Noise Filter

	Bus Width Filter	×
🔯 Bus Width Filter	Bus Width Filter	
	OK Cancel	

Bus Width Filter

Select the check box to activate the function of the Bus Width Filter in the dialog box, and then users can input the corresponding value of the width to be filtered in the right edit box. Input the time value of the width when the display is in the Time Display or the Frequency Display, and the unit is based on time, such as s, ms, us, etc.; if the inputted value is out of the range, it will switch to the best time value in range. Input the clock value of the width when the display is in the Sampling Site Display, and the range of the input is from 1 to 65535.

For example, after activating this function, and then input the value, 5ns. The Bus Data which is less than or equal to 5ns will be filtered as the figure below:



Before and After Filtering

	Data Contrast Settings Active Data Contrast Contrast Files Basic File LaDoc1 Contrast File LaDoc1 Image: Contrast File Contrast Beginning Point Image: Contrast Beginning of Data	×
Z Data Contrast	Contrast Result Error Stat. Roll the contrast waveforms synchronization Pin Assignment Display files the contrast differences Perform Contrast Display files horizontal Perform Contrast Do contrast automatically when being run Help	

Data Contrast

Data Contrast: It is used to contrast the difference for the two files of the same style. One is the Basic File, and the other is the Contrast File. The contrast file can display the difference between the Basic File and the Contrast File.

Taveform-Find			×			
C Activate the function of Chain-Data-Find						
Bus/Signal Name:						
Bus1		Next Previ	ous Close			
Bus Item:	Find:	Min Value:	Max Value:			
Data	▼ =	• 0	F			
Start At:	End At:	When Found:	- Statistics			
			Statistics			
Ds	Dp	▼ A ▼				
			0			

Waveform-Find Dialog Box without Activating the Function of Chain-Data-Find

Use the pull-down menu to select the Bus/ Signal Name:

The list of Find depends on whether it is a Bus or Signal that is being searched in:

Bus – Choose among =, !=, In Range and Not In Range (enter the value for Min Value and Max Value).

Signal – Choose among Rising Edge, Falling Edge, Either Edge, High and Low.

Start At - Choose the position to start our search by selecting one of the following:

Ds, T, A, B, etc. (select from the pull-down menu).

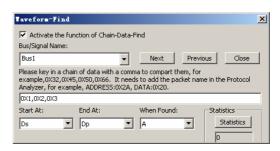
When Found - Choose A, B or other bars to mark the position where it is coincident with the set conditions.

 $\ensuremath{\textit{Statistics}}$ – Show the number of instances of the search results.

👪 Find Data Value ...

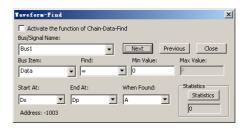
Remember the final condition

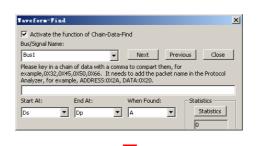
When the find function is used, the function of displaying the final conditions is added. When you have closed the Waveform-Find dialog box, and you want to find the set conditions, you can open the Waveform-Find dialog box again for the system has saved the last set conditions. d It is available only when searching through a Bus.

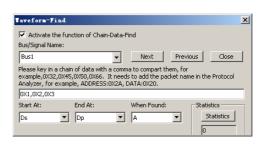


Waveform-Find Dialog Box with Activating the Function of Chain-Data-Find

The function of Chain-Data-Find is mainly for finding the data in the packets of Bus and Protocol Analyzer which have some serial data. For example, it can start finding with the serial packet segments (there are 0X1, 0X2 and 0X3) in the Bus. It improves the efficiency of Data Find. See the following process:







Process of Activating the Function of Chain-Data-Find

	s (*) S (*) 🗰	-	1 103 ▶ ▶> □ 2K ▼ 28 100 KHz ▼ 50% ▼ 4+ +> Page 1 ▼ Count 1 ▼ 1044.61538-▼ 2* 28 10 LF 16 14 +/ 20> Beight 26 ▼ Trigger Delay 1
Scale 0.26 Total 2049		Disp3 Disp3	ay Fest-1002
Fus/Signal	Tripper	Filter	-1927, 2 -1625, 3 -1024, 6 -1127 -1020, 7 -1613, 4 -1010, 5 -1816, 9 -
- Int	8	8	(000)(011)(012)(013)(014)(015)(016)(01
- 🖌 🐱 M	8 -	8.	
- 🖌 AL AL	8	15	Territore-Find
- / 12 13	18	8	Activity the function of Chain-Data-Find
- 💋 👪 A3	8	8	Bus/Signal Nome:
- * M M		10	Busi • Next Previous Close
- 🖌 X5 AS	8	8	Please key in a chain of data with a comma to compart them, for example, 0032,0045, 0050,0066. It needs to add the packet name in the Protocol
- 10 KG	18	8	Analyzer, for example, ADDRESS/052A, DATA (020)
# 17 XT	181	182	Start At End At When Found Statistics
/ 30 80	18	8	Ds V Dp V A V Subbics
- /3 1 01	8	18	Address: +1022
/ 12 50	18	8	
10 13	8	18	
11 14 14	181	10	
- / 15 15	8	8	
/ 16 25	12	12	
1 17 27	181	180	
/ 00 00	18	8	
et ci	8	15	
- / C2 C2	18	8	
	191	100	

Function of Chain-Data-Find Displayed on the Waveform Window

Signal Name:	
A0 💌	Next Previous Close
Find: Min Pulse Width: In Range 🔽 1	Max Pulse Width: Statistics
Start At: End At: Ds Dp	When Found:

Pulse Width-Find Dialog Box

Signal Name: It can select the single channel for Find.

Find: It can select the Find conditions which are "In Range", "Min Value", ">", "<" and " ". When users select the option of "In Range", they can input the value of the Min Pulse Width and Max Pulse Width between 1 and 65535 and find the Pulse Width in range. When users select the "Min Value", they can find the Min Pulse Width for the present single channel. When users select the options ">", "<" and "=", they can input the value of the Pulse Width between 1 and 65535 and find the Pulse Width in range.

Start At: Select the Start point of Find. The selectable items are all Bars; the default is the Ds Bar.

End At: Select the End point of Find. The selectable items are all Bars; the default is the Dp Bar.

When Found: Select a Bar to mark the found Pulse Width. The selectable items are all Bars; the default is A Bar.

Statistics: It can count the number of Pulse Width in the present range.

Next: It can find the next Pulse Width.

Previous: It can find the previous Pulse Width.

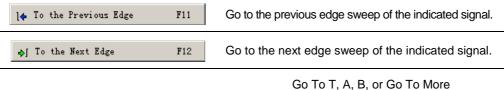
For example: Find in the A2 channel; the Pulse Width is equal to "40us"; take the A Bar as the mark. See the below figure:

💻 Find Pulse Width...

This function is mainly used for finding the pulse width in a single channel and the single channel of a Bus. It improves the efficiency of finding the Pulse Width for engineers and strengthens the Find function of the Logic Analyzer.

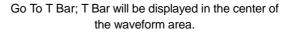
	8 8	87 10 1	1.7527	910: - 🗶	1 Ar	R. L.	M 10 - 01		Height	30 -	Trigger
Font Size 12	-			_							
Scale:1.752791us Total:20.49ms		Display Pos Display Ran	s-10.19ms 1ge:-10.23ms		0.19ms • 50us •		A - T = 10.19m B - T = 150us			= 10.34ms sr-Rate:No	•
Bus/Signal	Trigger	Fiter	-10.225056	n-10.216232n-	10.2075284-10	198754ma-1	19mg -10.181	235+10.1724	7,26-10.16370	8n-10.15494	4m-10.146
Bust			0×0) 0×1	(0×2)	(0×3	0×4)	0×6	0×6	0×7	(0×8
🖌 AO 44	8			10us	10us	10us	10us	10us	10us	10us	10u
- 🖌 A1 A1		8			20)us	20	IS	20	lus	1
- 🖌 👥 Al	8.	8.						40	lus		1
- A3 A		123		Pulse Width		_				×	
🖌 🗛 🗛		×		Signal Name:		_				~	
🖌 A5 A5		100		A2		•	Next	Previous	Close	1	
🖌 A5 A6				Find:	Pulse \ Kous			3	tatistics		
# AZ AZ				Start At:	End At		When Found:		Statistics		
- × 80 80	8				• Dp		A	-	0		
🖌 B1 81	8			Address: -10	19						
		100		_						_	
- 🖌 B2 82											

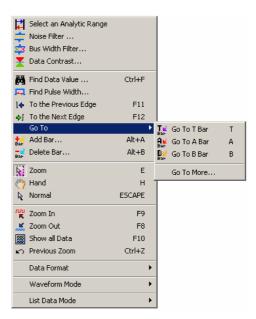
Pulse Width-Find on the Waveform Window



×

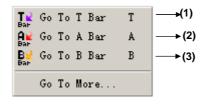






The selected bar will be shifted to the center of the waveform area.

Go To



(1) Press T, go to T Bar.

(2) Press A, go to A Bar.

(3) Press B, go to B Bar.

🙀 Add Bar... Alt+A

Add user defined bars.

- 1.Click the above menu item from **Data** menu, or click **Add Bar** icon from **Tool Bar**.
- 2. Give a **Bar Name**, define a **Bar Color**, and set a **Bar Position**.
- 3. Define the **Bar Key** with the number between 0 and 9.

Setting	
Bar Name C	OK Cancel
Bar Color	
Bar Pos 0	
Bar Key 3	

Add Bar

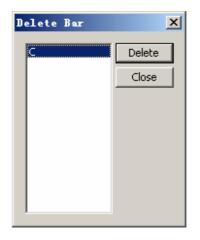
The number shortcut is set in the Add Bar dialog box. Every new bar can be filled in one number which is used to find the required bar faster; the default number of the new bar is 0. It is noticed that once the number key is set, it can't be modified, and each new bar can named with the same number, that is to say, one number can name many bars.

For example, users can set the number 3 as the shortcut key. When users press the number 3 key, the C Bar will be displayed in the centre position of the screen.

-⊉ Delete Bar Bar	Alt+B

Delete a user defined bar.

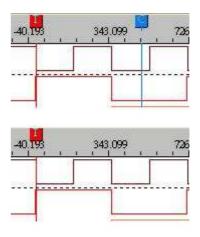
- 1. Click the above menu item from **Data menu**, or click **Delete Bar** icon from **Tool Bar**.
- 2. Select a user defined bar, and click on **Delete**.
- 3. Delete the selected Bar with the **Delete** key on the **Keyboard**. Use the mouse to select the added bar and press the **Delete** key on the keyboard to delete the bar.



Delete Bar Dialog Box

Add a Bar with the number between 0 and 9

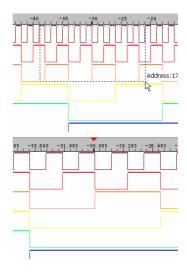
......



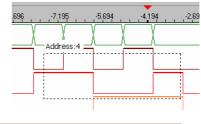
Delete a selected Bar.

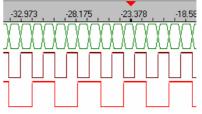
Zoom

Ε



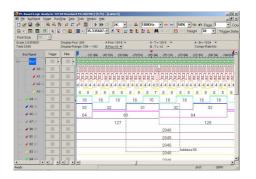
To **Zoom In**, left click and drag the mouse/point from left to right.





To **Zoom Out**, left click and drag the mouse/point from right to left.

A Zoom-In or a Zoom-Out view will be centered in the Waveform Display Area, and the new zoomed view will be sized according to the available space on the display.



To display the Tooltip, left click and drag the mouse/point from right to left or from left to right.

When users activate the **Zoom** to zoom in / zoom out the selected area, the Tooltip on the right corner of the bottom will display the Time, Clock or Address of the selected area.

When selecting the Zoom function, and users are pressing and dragging the left key, the information on the right corner of the bottom will be changed and updated with the width of the selected area. And the information is displayed on the right corner of the bottom in the way of Tooltip. When users loosen the mouse, the information will disappear.

Tooltip:

Time/Frequency Sample: xxx (time) /ns (unit)

Address: xxx (There is no unit with the address.)

Mand H	Click Hand, and then depress and hold the left mouse button to drag.
Normal ESCAPE	Reset the mouse function to the system default.



Zoom In and Out can be switched by changing the percentage value in the pull-down list.

1. The system can set the value of Zoom In and Out:

The default unit is μ s. When zooming in, it will be automatically changed to ns. When zooming out, it will be changed to ms, s or ks.

2.Pull-down Menu:

There are thirty scales.

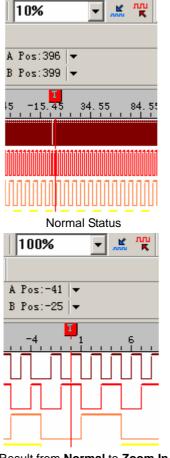
The maximum zoom in and out is the cycle of each grid, 0.0001piece.

The minimum zoom in and out is the cycle of each grid, 1,000,000,000.

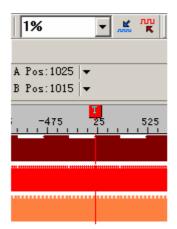
Zoom in and out (the proportion): with each grid being the cycle, the zoom in and out (%) is 100%. The time of Zoom In and Out counts by the clock of each grid (sample frequency). For example:

(1) Each grid is being a cycle; the zoom in and out is 100%. The time of Zoom In and Out will be presented by the clock of each grid X (1/sample frequency).

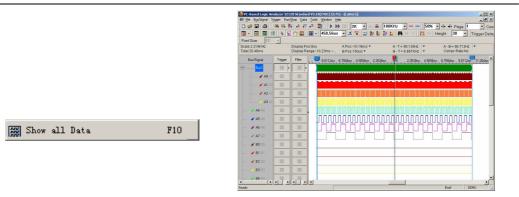
(2) Each grid stands for the clock of 100 pieces, the zoom in and out is 1% and the time of Zoom In and Out will be displayed by the cycle of each grid X (1/sample frequency).



Result from Normal to Zoom In



Result from Normal to Zoom Out



Show all Data

🖌 Previous Zoom	Ctrl+Z	Return to the last zoom.
Data Format	•	Binary Decimal Decimal(signed) ✓ Hexadecimal ASCII
		Data Format
		Show numerical information in Binary, Decimal. Decimal(signed), Hexadecimal or ASCII format
Waveform Mode	•	
Square Waveform		 ♦ To the Next Edge Go To ♦ Add Bar Alt+A Delete Bar Alt+B Zoom E Hand H Normal ESCAPE Zoom Out F8 Show all Data F10 Previous Zoom Ctrl+Z Data Format Waveform Mode I Square Waveform
		List Data Mode Sawtooth Waveform
		Square Waveform ◆[To the Next Edge F12 △ △ △ △ △ △
		Go To Go To Add Bar Alt+A Delete Bar Alt+B
		Mand H

ズ Zoom In ば Zoom Out

🗱 Show all Data

ᡢ Previous Zoom

Data Format

Waveform Mode List Data Mode

> F9 F8

F10

۲

Sawtooth Waveform

Square Waveform

Ctrl+Z

List Data Mode

The data for list mode are so many, to be convenient for users, that there is adding a List Data Mode function. The formats for the List Data Mode are All Data, Sampling Changed Dot (Compression) and Data Changed Dot (Compression).

•

All Data: It is the present display mode.

Sampling Changed Dot (Compression): Take the sampling changed dot as the compression data reference dot.

Data Changed Dot (Compression): Take the present data change dot as the compression data reference dot.

→ To the Next Edge Go To	F12 F12 Alt+A	80 /	81 🥖	82 /	83 	84 🥖	85 🥖	86 /	87 /	C0 /	C1 🥖
- 🐈 Add Bar		0	0	0	0	0	0	0	0	0	0
Bar Delete Bar	Alt+B	0	0	0	0	0	0	0	0	Ō	Ō
Zoom	E	000000000000000000000000000000000000000	0000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	000000000000000000000000000000000000000	0	000000000000000000000000000000000000000	0
		۱ă.	l ñ	lă.	lă.	lă.	lă.	lă.	lä.	l ñ .	l X
Normal	ESCAPE	Ιŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ	ŏ.	ŏ
00L m x		Ō.	Ō.	Ō	Ō	Ō	Ō	Ō	Ō	Ō	Ō.
🖧 Zoom In	F9	0	0	0	0	0	0	0	0	0	0
📈 Zoom Out	F8	8	8	0	0	0	0	0	0	8	
Show all Data	E10	IX.	l ñ	lă.	l ö	lă.	lă.	lă.	lă.	l ñ i	8
and a second sec		۱ň.	Ň.	۱ŏ.	۱ŏ.	۱ŏ.	۱ŏ.	۱ŏ.	۱ŏ.	۱ŏ.	ň.
🔊 Previous Zoom	Ctrl+Z	Lõ.	ŏ	ŏ.	ŏ.	ŏ.	ŏ.	ŏ.	ŏ.	ŏ	ŏ.
Data Format			0	0	0	0	0	0	0	0	0
Data Format	· ·	0	0	0	0	0	0	0	0	0	0
Waveform Mode	•	0	8	0	0	0	0	0	0	8	8
		18.	. ×.	L 8	L 8	L 8	L 8	L 8	L 8	Lă -	Ň.
List Data Mode	Þ	V 1	All Dat	a						ŏ	ŏ
	1 0 0 0	Sampling Changed Dot(Compression)						0	0		
										10	0
	1 0 0 0.	Data Changed Dot(Compression)						_ K	lă.		
i i i i i	1 0 0 0	ň	ŏ	ň	ň	ň	ň	ŏ	ŏ	Γŭ	ŏ.
0 1 0 1	1 0 0 0	Ō.	0	Ō.	Ō.	Ō.	Ō.	0	0	Ō.	Ō.
	1 0 0 0	0	0	0	0	0	0	0	0	0	0

List Data Mode: All Data, Sampling Changed Dot (Compression) and Data Changed Dot (Compression).

Menus and Tool Bars (cont'd)

6. Tools

🔁 Customize	Customize
The Color Setting	Common Setup Toolbars Shortcut Key Auto Save
Bus Froperty Refresh Frotocol Analyzer Multi-stacked Logic Analyzer Settings Analog Waveform	Waveform Display Mode C Sampling Site Display Frequency Display Image: Time Display Hide time of waveform Ruler Waveform Setting Regular Ruler Waveform Height 26 Image: Time/Sampling Site Ruler Font Size Correlated Setting Font Size Image: Auto-Close Open/Close Compression Warning Show Gridline Show the T Bar in the middle area Show Tooltip Open/Close Double Warning Image: When the roller is moved toward back, the Time Axis in the waveform area will move toward right. Data Process What do you want to show when you press the Stop during the running? Image: Keep the Present Data Restore Defaults

Tools Menu



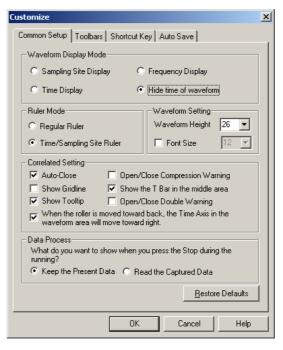
Show Time/Height Tool Box

Menu Bar: Tools

Menu Item

📑 Customize ...

Detail Menu & Dialog Box



Customize Dialog box

Customize X
Common Setup Toolbars Shortcut Key Auto Save
Common Setup Toolbars Toolbars V Trigger PRun/Stop V Trigger Content Set V Display Mode VMouse Pattern VZcom V Data V ShowTime/Height V Trigger Delay Font Size V Data Contrast/Screen Display
OK Cancel Help

Toolbars Setting

Customize		×
Common Setup Toolbars S	Shortcut Key Auto Save	
Commands:	Current Keys:	
Add Bar C Capture Window Close Delete Bar Down End Esc Export Waveform F2 Currently affected to : Description: ★ ★ Add Bar Bar	Alt+A Select New Shortcut Key:	Assign Remove Reset All
[OK Cancel	Help

Shortcut Key Setting

Customize
Common Setup Toolbars Shortcut Key Auto Save
I✓ Activate File Name: LA
Save Path Name:
D:\Backup\LA Data
Repetitive Run Time Interval:
OK Cancel Help

Save Setting

Name	🗖 Relating	Color	
Waveform Background			
List Background 1			
List Background 2			
Cursor			
Grid			
Unknow Line			
Default Bus			
Bus Text			
List Text			
Time Text			
Bus Error			
Bus Error Text			
Signal Filter Bar			<u> </u>
- Preview			
	0 0 0	After the ba	ickground is
0 X 1 X 0	0 0 0	altered, cor	responding col
		automatica	
10 10 10		ratio.	o the contrast
	1 1 1	1 Tau0.	
		Andreas Frain	
		Vhen being background	g printed, the
		Dackyround	uis white.

Color Setting

🎦 Color Setting...

C Bus	Color Config
Activate the Latch Function	Register
Protocol Analyzer Setting	
Protocol Analyzer	Parameters Config
 ⊂ CAN 2.08 MODULE V1.32.00(CN01) ⊂ HDQ MODULE V2.07.00(CN01) ⊂ T2C MODULE V2.02.00(CN01) ⊂ SPI MODULE V1.13.00(CN01) ⊂ UART MODULE V2.13.00(CN01) ⊂ USB1.1 MODULE V1.62.00(CN01) 	

Bus Property

Bus: Activate the function of analyzing the Bus.

Color Configuration: Open the Color Configuration dialog box to set the conditions for the Bus.

Activate the Latch Function: Activate the latch function.

Protocol Analyzer: Activate the function of analyzing the Protocol Analyzer.

Use the DsDp: Use the Ds and Dp to help analyze the Protocol Analyzer.

Find: Find the desired Protocol Analyzer module. Users can input the Protocol Analyzer name to quickly find the Protocol Analyzer module from many Protocol Analyzers. After inputting the first character of the name in the Find box of Bus Property dialog box, the corresponding module will be displayed in the Protocol Analyzer list box according to the input character. See the figure below:

us Property	
Bus Setting C Bus	Color Config
Protocol Analyzer Setting	register
Protocol Analyzer CAN 2.0B MODULE V1.32.00(CN01)	Parameters Config
C HDQ MODULE V2.07.00(CN01) C 12C MODULE V2.02.00(CN01) C SPI MODULE V1.13.00(CN01) C UART MODULE V2.13.00(CN01) C USB1.1 MODULE V1.62.00(CN01)	
↓ Use the DsDp	Find
OK	Cancel Help

Find Editor Box

When you input "I" in the Find editor box, the Protocol Analyzer list displays all Protocol Analyzers with the initial character of "I"; see the below picture:

BUS Bus Property. .

C Bus	Color Config
Activate the Latch Function	Register
Protocol Analyzer Setting	
Protocol Analyzer	Parameters Config
© I2C MODULE V2.02.00(CN01)	
☑ Use the DsDp	Find

Find Result

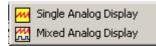
2	Refresh	Protocol	Analyzer	
	meri esu	TIOCOCOL	Anaryrei	

Multi-stacked Logic Analyzer

Refresh Protocol Analyzer data.

OK Cancel Help	Settings	Multi-stacked Logic Analyzer Settings Activate Stack Stack Type Memory Stack Channel Stack Please select the Logic Analyzer for stacking M1 S/N:000000-0000 M4 S/N:000000-0000 M4 S/N:000000-0000 M4 S/N:000000-0000 Synchronous Channel A0 Synchronous Trigger Condition Rising Edge
----------------	----------	---

Multi-stacked Logic Analyzer Settings Dialog Box



Analog Waveform

When the function of Analog Waveform is activated, the Analog Waveform will be displayed in the waveform area of the Bus's sub-channel and take the space of four channels. And four sub- channels won't draw the waveform. It notes that the sub-channel of the Bus must be more than four channels.

Analog Waveform

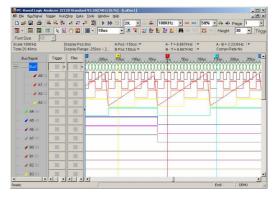
۲

The function of Analog Waveform means that the Display Mode of Bus Data is not the Pure Data Mode, while it displays data change with the curve which looks like a waveform, which, in fact, is a curve to describe the data change. So it is called the Analog Waveform.

The Analog Waveform can be divided into two kinds, namely, Single Analog Display and Mixed Analog Display, see the figures as below:

		+ +		0 00 I	28			100KH		101 .001		- 14 +		
🛛 - 🖾 📑 🖆	8 R 8	(*) 🗰	. 10	lus		R	3 AF	Be In	t. M		20	 Height 	30	- 1
Font Size 12 Scale 100KHz	×		-		Pos-1				T = 6.66				333kHz	11222
Scale 100KHZ Total 20.48ms		isplay Po: isplay Ra	nge:-250us		Pos:15				T = 6.68			A-8=: Compt-		1.
Bun/Signal	Trigger	Filter	2	0u:	A 150µ#	:100µ#,		Ura		0u;	100µs	150µs	200ur	250,#
8 <mark>8-11</mark>			00000	0000		XXXX	XXXX	0000	XXXX	XXXX	0000	XXXXX	0000	XXXX
- 🖌 AD 🖂	8	8	/											
- 🖌 🖌 A1 A1	8	8	1											
🖌 A2 A3		8	1											
- 🧳 A3 A3														
🖌 🗛 🗛					1									
🖌 A5 A5		8			1		-					_		
🖌 🗚 🗛	8	8			1							_		
# A7 A7		12			1									
🖌 80 80	8		1											
🖌 🛙 🕅	8	12												
🖌 B2 82	8	8												
6 83 83		12												

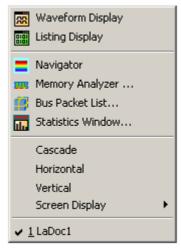
Single Analog Display



Mixed Analog Display

Menus and Tool Bars (cont'd)

7. Windows

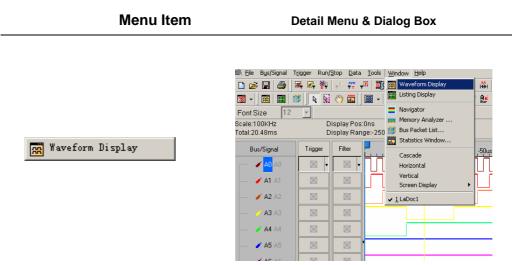


Window Menu



Window Tool Box

Menu Bar: Windows



Display Signals in Waveform.

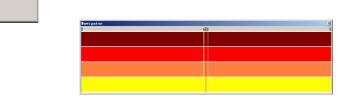
📰 Listing Display

Navigator

_

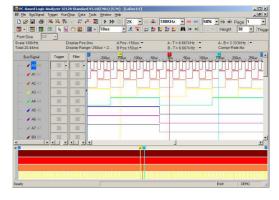
🎉 Eile B <u>u</u> s/Signal Trigge	er Ru	un/ <u>S</u> to	p D	ata	<u>T</u> ools	Wir	ndow	Help				
🗅 🧀 🔚 🎒 🔍	2 , {	n y	P	¥ yŰ	I 🛛 🔟	22	Wav	eform	n Displ	ay		1
🛪 - 💌 🕮 🥵	R	§] (") 6				Listin	ıg Dis	play			A K Bar
Font Size 12 -	1						Navi	gator				
	-	Die	olay P	200:0	no		Mem	ory A	nalyze	er		
Total:20.48ms			olav P				Bus R	Packel	t List.			
10tal.20.40115		DIS	лау г	vang	e	-	Shahi	stics \	Windo			
	AO	A1	A2	A3	A4	ulu	Juan	suus i	windo			-83 B
Time	~	2	2	~	7		Case	ade				13 0
	1	1	1		•			ontal				
-150us	4	4		0	4							
-140us	0	0	1	Ō	1		Verti	cal				
-130us	ň	ŏ	1	ŏ	11		Scre	en Dis	play		•	ŏĽČ
-120us	Ó	1	1	0	1							
-110us	1	1	1	0	1		<u>L</u> LaDo					0 0
-100us -90us	0		0			1	2 LaDo	001:2				
-900s -80us	Ó	1	Ö	1		1	1	1	ΙŌ	ΙŌ	Ō	διά
-70us	Ĭ	1	ŏ	1	1	1	1	1	ŏ	ŏ	ŏ	ŏŏ
-60us	Ó	Ó	1	1	1	1	1	1	0	0		0 0
-50us	1	0	1	1	1	1	1	1	Ó	Ó	Ó	<u>o</u> o
-40us -30us	0	1	1	1		1	1 0	1 0	Ó	Ó	0 0	0 0 0 0
-300s -20us		l ñ	l ñ	Ň	l ñ l	ň	ň	n I	Ö	Ö	ň	
1000	- d-	Ĩ,	Ľő.	Ľő.	l å l	ŏ.	ň	ŏ	l ő –	Ľ.	ň	ŏŏ

Display Signals in Listing.

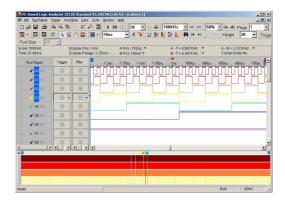


Navigator Window

d The Navigator Window is displayed under the waveform display area when activating the Logic Analyzer. The Navigator displays the waveform length of all the captured data; it only can display the waveform of the data of four channels. In the Navigator Window, users can click the Left Key of the mouse to select the waveform randomly. The selected waveform keeps pace with the waveform in the waveform display area. The size of the selection frame is in inverse proportion to the Zoom Rate; the larger the Zoom Rate is, the smaller the size of the selection frame is. Users can also click the Right Key of the mouse to select the displayed channel.

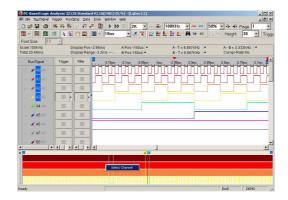


Navigator Window under the waveform display area



Blue Frame in the Navigator Window

There is a blue frame in the above Navigator Window. Users can click the Left Key of the mouse to select the waveform randomly.



Select Channel button

After clicking the Right Key of the mouse, the Select Channel dialog box will pop up as below.

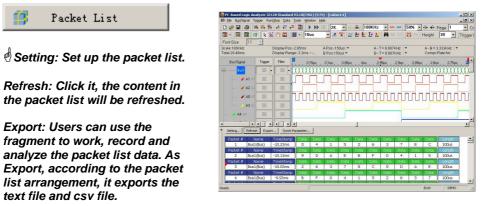
Select Ch	annel	×
Select Cr A0[A4 A1[A A2[A3 A4[A4 A5[A4 A5[A4 A5[A4 A5[A4 A5[A4 B0[B0 B1[B1 B2[B2 B3[B3 B4[B4 B5[B5] B5	D] 1] 2] 3] 4] 5] 6] 7] 0] 1] 2] 2] 2]	Cancel
1-1-1-1-1-1		

Select Channel dialog box

In the Select Channel dialog box, users can select the channel which users want to display; users can select four channels at most; the defaulted channels are A0, A1, A2 and A3 (there are four channels in total).

<< <	>	>> 0p	tion I	inport	Export	Merge	R	stresh	Reset	Display Alt	eration		M		
Bus1(12C)															
Address	Write d	ata	Read data												
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
0000															
0X10															
01020															
0:030															
00(40															
0:050															
0:060															
00070															
03080															
0.490											-				
OXAD															
0:080															1
OXC0															

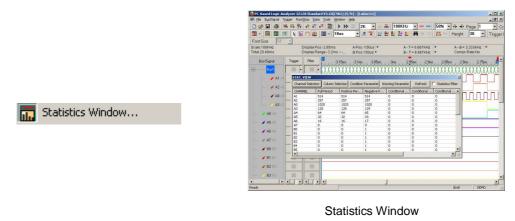
Memory Analyzer Interface

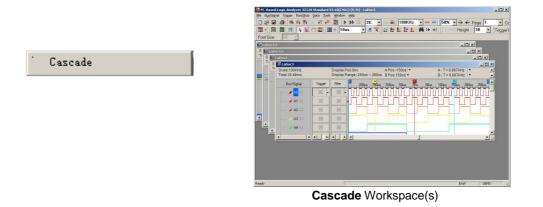


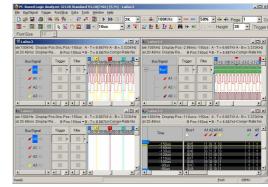
Synch Parameter: Open the Synch Parameter Setting dialog box.

🊃 Memory Analyzer

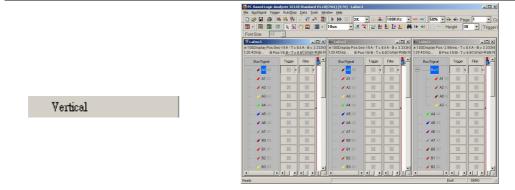
Display Packet List







Align Workspace(s) horizontally



Align Workspace(s) vertically

Horizontal

	Screen Display 💦 🕨	
-10	Double Screen Display	
Н	First Screen Display	
Ē.	Second Screen Display	

Screen Display:

When there are two displayers connecting, users can select , Double Screen Display, to display waveforms on both two displayers; it is convenient for displaying more waveforms. First Screen Display, or , Second Screen Display, can also be selected to display waveforms on the first displayer or the second displayer.

Stopwatch Function:



Stopwatch Function

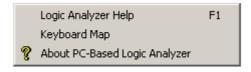
The function will show at right corner of the bottom of the screen while sampling data. It times from users pressing the ensured key at the Bus Property dialog box to Bus insert sending back analyzed data. Please look at the left figure.

It has five functions as following:

Time of waiting for triggering, Time of triggering success, Time of sampling data, Time transmitted to computer after sampling data finished and Time of Bus data overloading.

Menus and Tool Bars (cont'd)

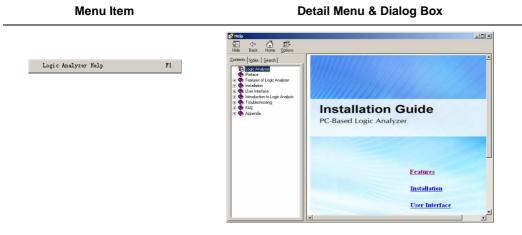
8. Help



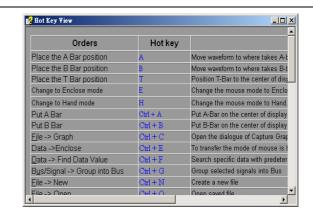
Help Menu

Menu Bar: Help

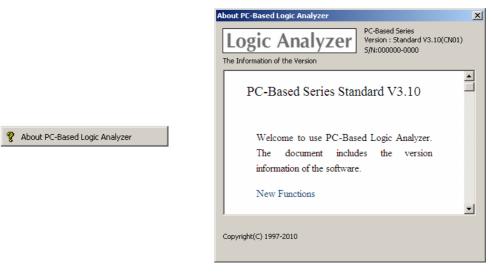
Keyboard Map



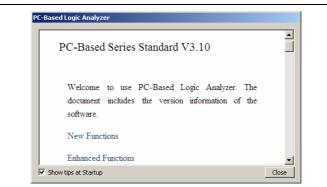
Open Logic Analyzer Help file.



The Table of Keyboard Map



About PC-Based Logic Analyzer



Software Version Information Display Window

The function of Software Version Information Display for PC-Based LA means that the software will open a small window which displays the software version, new functions and bug modifications when activating the software. It is convenient for users to know the information of the present software version.

Right Key

Menu Item

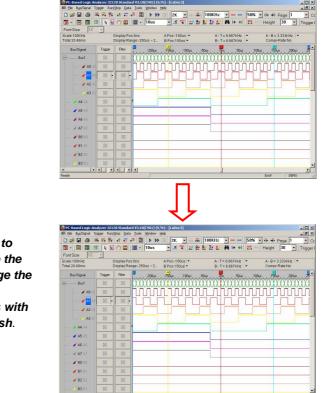
Right Key Menu on the Bus/Signal Column

The Right Key menu is added on the basis of the Bus/Signal menu. So the function of Sampling Setup, Channels Setup, Bus Property, Group into Bus, Ungroup from Bus, Format Row and Rename are the same as those in the Bus/Signal menu. And the function of the Analog Waveform is the same as that in the Tools menu.

Detail Menu & Dialog Box

aus	Sampling Setup Channels Setup Bus Property Analog Waveform Reverse	•
	Group into Bus Ungroup from Bus	Ctrl+G Ctrl+U
	Add Channel Copy Channel Delete Channel Delete All Channels Restore Default Channels	
	Format Row Rename	•

Right Key Menu on the Bus / Signal Column



Reverse Function Displayed in the Waveform Window

.



Add the required channel in the Bus / Signal column.

Reverse

This function of Reverse is used to reverse the collected signal. Change the High Level into the Low Level; change the Low Level into the High Level. The Reverse of Waveform Mode displays with the dashed, so it is easy to distinguish.

Add Channel ...

	PC-Based Logic Analyzer
Copy Channel	Do you want to copy the channel ?
	Copy the selected channel in Bus / Signal column.
	PC-Based Logic Analyzer
	Do you want to delete the channel ?
Delete Channel	OK Cancel
	Delete the selected channel in Bus / Signal column.
	PC-Based Logic Analyzer
	All the Buses and channels will be deleted. Do you want to continue? OK Cancel
Delete All Channels	Delete all Buses and channels in Bus/Signal column.
	PC-Based Logic Analyzer X All the Buses and channels will restore to the default. Do you want to continue? OK
Restore Default Channels	Restore the deleted Buses and channels in Bus/Signal Column.

Right Key Menu on the Waveform Area

The functions of the right key menu on the waveform area are similar to those of the Data menu.

The menu adds the functions, such as Place Ds and Dp, Add Bar in the waveform display area.

	Find Data Value Find Pulse Width Go To	Ctrl+F	
	Place		
+ 2 Ba⊨	Add Bar		
N	Zoom	Е	
87	Hand	н	
R	Normal	ESCAPE	
222	Show all Data	F10	
	Previous Zoom	Ctrl+Z	
5	Previous 200m		
5	Data Format	•	-
K.)		•	
	Data Format	•	- - -
	Data Format Waveform Mode	•	-

Right Key Menu on the

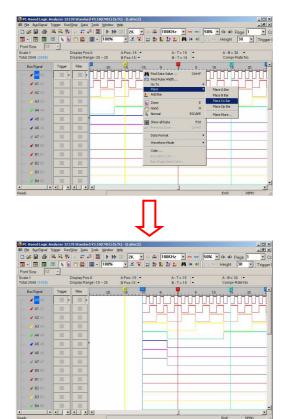
Waveform Area

Place	Place A Bar
	Place B Bar
	Place Ds Bar
	Place Dp Bar
	Place More

The right key menu on the waveform area adds the function of Place Ds and Place Dp. However the functions are only used after the Ds and Dp bars are activated, otherwise they will be disable. These functions are the same as that of A Bar.

When the mouse is stopped at a special position, click the right key on the mouse, select the Place Ds or Place Dp, the Ds or Dp bar will move to the special position.

For example, Open "Select an Analytic Range", select the special position is "-10", and then select "Place Ds". See the figure in the right column.



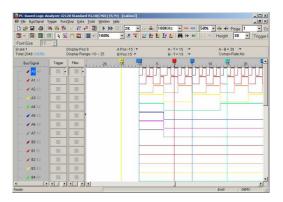
Place Ds Bar

♣⊉ Add Bar

When the mouse is located at a special position on the waveform area, click the right key to select the Add Bar function; a bar will be added automatically in the special position according to the sequence of the word and color. See the C Bar in the position "5" in the right column.

		+ # (*) 🖬		100%	2K	÷ NV	11	00 U	100F		-	• • • j	50%	• 👫 🏟 Height	Page 30		• Trig
cale:1 otal:2048 (1035))isplay Po)isplay Ra		~ 25	08:-15 08:15					A - T B - T		•			: 30 🗣		
Bus/Signal	Trigger	Filter		-20	 Į.,	-			s			. 5 .	10			20	
— 🖌 🖊 🖌 —		- 12					Л			П	Ш		Find Data Find Pulse			Ctri+F	Ľ
- 🖌 A1 A1								l	Л				Go To	s width		,	Г
- 🖌 A2 A2		12						_					Place Add Bar			,	
— 🧳 🗛 🖂	8	8										5				ε	
- × A4 64		122	1										Hand Normal			H	
- 🖌 A5 A5	8		ł							_		1000	Show all t	late.		F10	
- 🖌 🗚 🕹	181	8											Previous			Ctri+Z	
- # AZ A7	8	8											Data For				
- 🖌 80 80		122										_	Waveform	n Mode		,	
- 🥖 B1 81	12												Color Bus Data				
🖌 B2 82		8											Bus Single	: Data Gok	500		
🎸 B3 83	12	8															
- / B4 84	18	180															

$\hat{\mathbf{U}}$



Add a Bar on the Waveform Area.

User Interface

1. Find Data Value

Find Data Value is a very useful tool to help the user to find data on the received signals.

Step 1 Click the Find Data Value discon; the dialog box of Waveform-Find will appear.

Step 2 Using the pull-down menu, select the Bus/Signal Name.

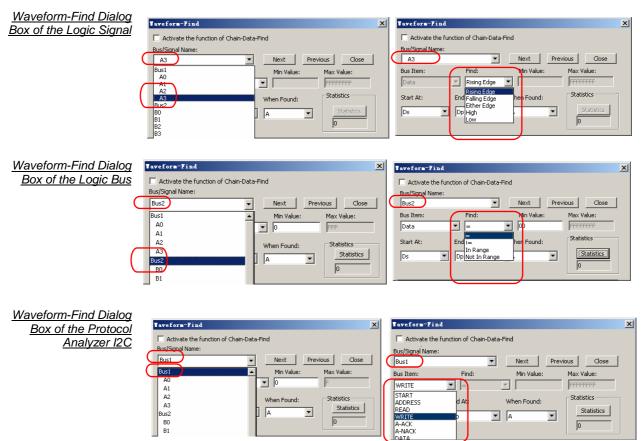
The Bus/Signal listed on the pull-down menu represent the status of the Bus/Signal column as shown :

Bus/Signal	Trigger	Filter	Taveform-find	Bus/Signal	Trigger	Filter	Taveform-find
#			Activate the function of Chain-D Bus/Signal Name:	Bus1			Activate the function of Chain-D Bus/Signal Name:
+ Bus2		8	Bus1 Bus1 Bus2	🖌 AO AC	×		Bus1 Bus1 A0
🖌 B1 B1	×	8	81 82 - 83	🖌 🖌 A1	×	×	A1 A2 A3
🖋 B2 B2		×	84 85 86 87	🖌 A2 A2	×	×	Bus2 B1
/ B3 B3			87 C0 C1 C2	/ A3 A3	×		82 83 84 85
/ B4 B4			C3 C4	+ Bus2			B6 B7 C0
/ B5 B5		×	C5 C6 C7	🖌 B1 B1			C1 C2 C3
🖋 B6 B6		×	D0 D1 D2 D3	/ B2 B2	×		C4 C5 C6
🖋 B7 B7	×	×	D4	🧭 B3 B3	×	×	C7 D0 D1
	NM N	52	D6 D7	/ B4 B4	8	X	D2 D3

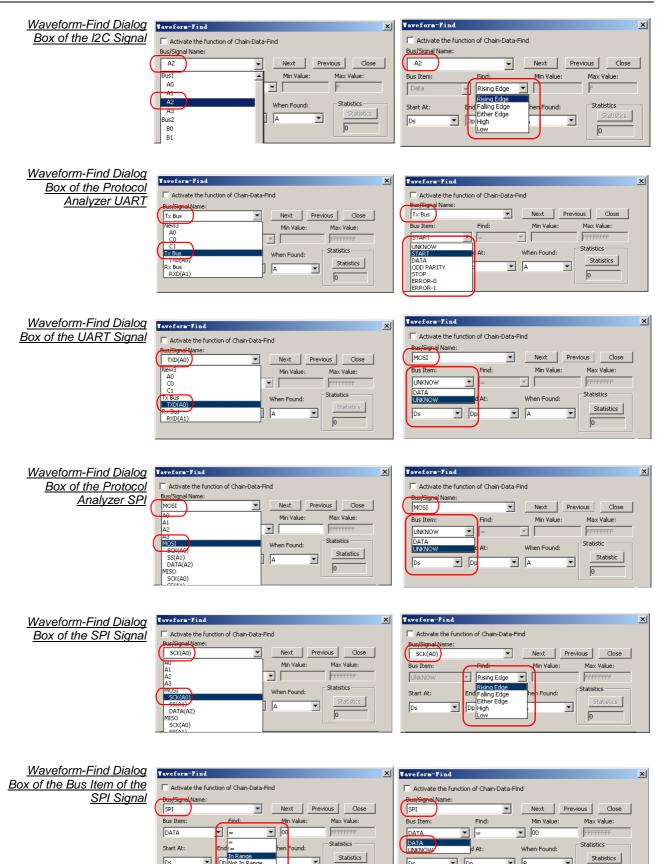
Step 3 Choose the character for Find. The list of characters depends on whether it is a Bus, Signal, or the protocol analyzer such as I2C, UART, SPI, etc., which is being searched.

Bus: Choose among = , != , In Range and Not In Range (Enter the Min Value or Max Value). **Protocol Analyzer:** Choose the segments bits of the protocol analyzer (Select the protocol analyzer item and enter the value for Min Value or Max Value).

Signal: Choose among Rising Edge, Falling Edge, Either Edge, High or Low.



User Interface



Ds

Address: 600

Dp Not In Range

•

0

• Dp

▼ B

•

0

Ds

Address: 600

Choose the position to start the search by selecting one of the following: Step 4 Start At: Ds T , A, B, C, etc.; End At: Dp, A, B, C, etc.. Then click Next or Previous to search it.

When Found: Choose a Bar to mark the result: A, B, C, etc.

Click Statistics to show the number of instances of the search results. Step 5

 $\overset{e}{lash}$ It is available only when searching through a Bus.

The A Bar is placed at the 0X08 of Bus1 where the condition of the Waveform-Find is set. The Statistic of Waveform-Find shows a <u>"128".</u>

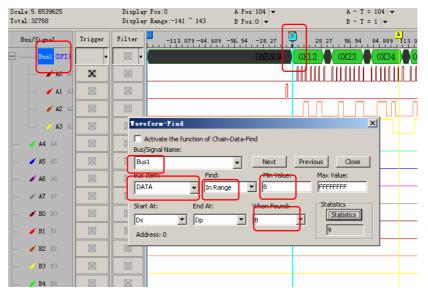
S T

Scale:0.25 Total:2048		Display Pos:-823 A Pos:-823 ▼ A - T = 823 Display Range:-829 ~ -815 B Pos:15 ▼ B - T = 15
Bus/Signal	Trigger	Filter -828 -826.75 -825.5 -824.25 -823 -821.75 -820.5 -819
		🛛 🗸 🗘 0X2 🗸 0X3 🗸 0X4 🖉 0X5 🖉 0X6 🖉 0X7 🖉 0X8 🖉 0X9 🖉 0XA 🖉 0XB
🖌 AO AC	X	
🖌 🗚 Al	X	Tavefors-Find
🥖 A2 A2		Activate the function of Chain-Data-Find
🧭 A3 A3		Bus/Signel Name:
🖌 A4 A4		Bus Item; Find: Max Value:
🖌 A5 A5		Data = 8 FFFFFF
🖌 🖌 🖌		Start At: End At: When Found: Statistics
🖋 A7 A7		
— 🥖 во во		Address: -823
🖌 B1 B1		
62 B2		

The A Bar is placed at the 0X6A of Bus1 where the condition of the Waveform-Find is set.

Scale:0.25 Display Post=662 A Post=662 ▼ fotal:2048 Display Range:=668 ~ -654 B Post=15 ▼	$A - T = 662 \bullet B - T = 15 \bullet $
	0.75 -659.5 -658.2
	KEBXOXECXOXEDXO:
- Al Al X Tavefors-Find	×
- 🖌 A2 📈 🔣 🗖 Activate the function of Chain-Data-Find	
A3 A Bus/Signal Name: Bus1 Vext Previous	Close
	« Value:
- 🖌 AS AS 🖂 📃 Data 🔽 = 🔽 6A FFF	FFFFF
AB At XX Dictir RC. End RC. Which round.	atistics
	8
Address: -662	
/ B2 B2	
— / BO BO	

The B Bar is placed at the 0X12 of Data of Protocol Analyzer SPI where the condition of the Waveform-Find is set.



User Interface (cont'd)

2. Statistics Feature

This chapter presents detailed information on the **Statistics** feature in the software interface. The **Statistics** feature presents user information pertaining to nine periodicities:

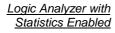
- Full Period,
- Positive Period,
- Negative Period,
- Conditional Full Period,
- Conditional Positive Period,
- Conditional Negative Period,
- Start Pos,
- End Pos and
- Selected Data.

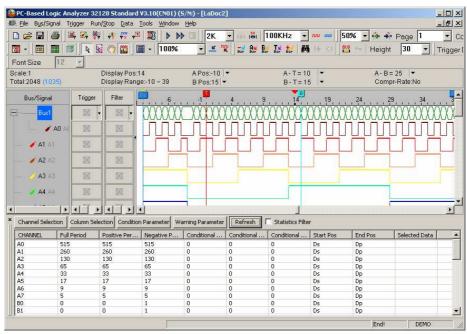
Click on the **Statistics** icon **m**, and an following interfaces will appear:

Stat.view

STAT. VIEV

CHANNEL	Full Period	Positive Per	Negative P	Conditional	Conditional	Conditional	Start Pos	End Pos
AO	515	515	515	0	0	0	Ds	_
								Dp
A1	260	260	260	0	0	0	Ds	Dp
A2	130	130	130	0	0	0	Ds	Dp
A3	65	65	65	0	0	0	Ds	Dp
A4	33	33	33	0	0	0	Ds	Dp
A5	17	17	17	0	0	0	Ds	Dp
A6	9	9	9	0	0	0	Ds	Dp
A7	5	5	5	0	0	0	Ds	Dp
BO	0	0	1	0	0	0	Ds	Dp
B1	0	0	1	0	0	0	Ds	Dp
B2	0	0	1	0	0	0	Ds	Dp
B3	0	0	1	0	0	0	Ds	Dp
B4	0	0	1	0	0	0	Ds	Dp
B5	0	0	1	0	0	0	Ds	Dp
B6	0	0	1	0	0	0	Ds	Dp
B7	0	0	1	0	0	0	Ds	Dp
C0	0	0	1	0	0	0	Ds	Dp
C1	0	0	1	0	0	0	Ds	Dp





2. Statistics Feature (cont'd)

There are four options for adjusting how statistical information may be presented. These four options are:

- Channel Selection,
- Column Selection,
- Condition Parameter and
- Warning Parameter.

Channel Selection

Allow the choice of pins in which port will be included in the statistical analysis of a test run.

Channel 5	eleci	tion							×
	7	6	5	4	3	2	1	0	
Port A	◄	$\overline{}$	$\overline{}$	◄	◄	$\overline{}$	◄	◄	
Port B	◄	◄	$\overline{\mathbf{v}}$	◄	◄	$\overline{\mathbf{v}}$	◄	◄	
Port C	$\overline{}$	◄	$\overline{}$	$\overline{}$	◄		$\overline{}$	◄	
Port D	◄	◄	•	◄	◄	◄	◄	◄	
Port E	Г			Г			Г		
Port F	Г							Г	
Port G									
Port H									
Port I			Г	Γ		Г	Γ	Г	
Port J	Г		Γ	Γ		Γ	Γ	Γ	
Port K									
Port L	Г						Г	Г	
Port M									
Port N								Г	
Port O									
Port P	Γ		Г			Г			
Select	all)	Cle	ar all		ОК		Ca	ncel	

Column Selection

<u>Allow the choice</u> <u>of items which</u> <u>will be considered in</u> <u>the statistical results.</u>

Column Selection	×
Probe	
🔽 Full Period	
Positive Period	
🔽 Negative Period	
🔽 Conditional Full Period	
🔽 Conditional Positive Period	
🔽 Conditional Negative Period	
🔽 Start Pos	
🔽 End Pos	
🔽 Selected Data	
OK Cancel	

Condition Parameter

Allow the setting of time intervals for Conditional Full Period, Conditional Positive Period and Conditional Negative <u>Period.</u>

Condition Parameter	×
Conditional Full Period	
20us <= Time <=	20us
Conditional Positive Period	
10us <= Time <=	10us
Conditional Negative Period	
10us <= Time <=	10us
ОК	Cancel

2. Statistics Feature (cont'd)

<u>The Numbers of</u> <u>Data Qualified by</u> <u>Condition Parameter</u>

Channel Sele	ction Column Se	election Condition	Parameter Wa	arning Parameter	Refresh [Statistics Filte	r	
CHANNEL	Full Period	Positive Per	Negative P	Conditional	Conditional	Conditional	Start Pos	End Pos
A0	515	515	515	0	0	0	Ds	Dp
A1	260	260	260	0	0	0	Ds	Dp
A2	130	130	130	0	0	0	Ds	Dp
A3	65	65	65	0	0	0	Ds	Dp
A4	33	33	33	0	0	0	Ds	Dp
A5	17	17	17	0	0	0	Ds	Dp
A6	9	9	9	0	0	0	Ds	Dp
A7	5	5	5	0	0	0	Ds	Dp
B0	0	0	1	0	0	0	Ds	Dp .
B1	0	0	1	0	0	0	Ds	Dp
B2	0	0	1	0	0	0	Ds	Dp
B3	0	0	1	0	0	0	Ds	Dp
B4	0	0	1	0	0	0	Ds	Dp
B5	0	0	1	0	0	0	Ds	Dp
B6	0	0	1	0	0	0	Ds	Dp
B7	0	0	1	0	0	0	Ds	Dp
C0	0	0	1	0	0	0	Ds	Dp
C1	0	0	1	0	0	0	Ds	Dp

Warning Parameter

Set the conditions which will be marked to call users' attention.

Conditions	ing becong	
	Min	Max
Period	✓ 10us	✓ 100us
C Frequency	10KHz	100KHz

<u>The numbers of data</u> <u>qualified by warning</u> <u>conditions are printed in</u> <u>black, otherwise in red.</u>

Channel Sele	ction Column Se	lection Condition	Parameter Wa	rning Parameter	Refresh	Statistics Filter	r	
CHANNEL	Full Period	Positive Per	Negative P	Conditional	Conditional	Conditional	Start Pos	End Pos
A0	515	515	515	0	0	0	Ds	Dp
A1	260	260	260	0	0	0	Ds	Dp
A2	130	130	130	0	0	0	Ds	Dp
A3	65	65	65	0	0	0	Ds	Dp
A4	33	33	33	0	0	0	Ds	Dp
A5	17	17	17	0	0	0	Ds	Dp
A6	9	9	9	0	0	0	Ds	Dp
A7	5	5	5	0	0	0	Ds	Dp
B0	0	0	1	0	0	0	Ds	Dp
B1	0	0	1	0	0	0	Ds	Dp
B2	0	0	1	0	0	0	Ds	Dp
B3	0	0	1	0	0	0	Ds	Dp
B4	0	0	1	0	0	0	Ds	Dp
B5	0	0	1	0	0	0	Ds	Dp

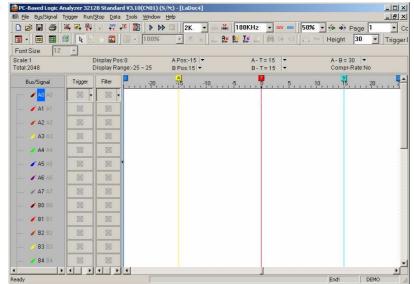
User Interface (cont'd)

3. Customize Interface

This chapter presents detailed instructions pertaining to:

- how to modify the Waveform Display Mode, -
- how to modify the Ruler Mode, _
- how to modify the Waveform Height,
- how to modify the Correlated Setting. _

The Interface Layout Shown in Default Settings



Modify Waveform To modify the display mode, users can use icons on the tool bar/box, or menu. Display Mode For the menu, go to Tools and click Customize.

Customize the Display Mode by Using the Tool Bar

💼 Customize	Customize 🔀
Customire Color Setting Bus Property Refresh Protocol Analyzer Multi-stacked Logic Analyzer Settings Analog Waveform	Common Setup Toolbars Shortcut Key Auto Save Waveform Display Mode © Sampling Site Display © Frequency Display © Time Display © Hide time of waveform NHER Wore © Regular Ruler © Time/Sampling Site Ruler © Time/Sampling Site Ruler © Correlated Setting © Auto-Close © Open/Close Compression Warning © Show Gridline © Show the T Bar in the middle area © Show Tooltip © Open/Close Double Warning © When the roller is moved toward back, the Time Axis in the waveform area will move toward right. Data Process What do you want to show when you press the Stop during the running? © Keep the Present Data © Read the Captured Data <u>Bestore Defaults</u> OK Cancel Help

3. Customize Interface (cont'd)

Tool Bar



Sampling Site Display
 Time Display
 Frequency Display
 Hide time of waveform

хI

Waveform Display Mode There are four display modes to determine the method of capturing data from sampling:

- Sampling Site Display,
- Time Display,
- Frequency Display and
- Hide time of waveform.

Modify Ruler Mode Use the menu to modify the Ruler Mode. Go to Tools and click Customize.

Rulei	r Mode
ruioi	mouo

Common Setup Toolbars Shortcut Key Auto Save
Waveform Display Mode
C Sampling Site Display C Frequency Display
Time Display Explanation Hide time of waveform
- Ruler Mode
C Regular Ruler Waveform Height 30 -
Time/Sampling Site Ruler Font Size
Regular Ruler
Scales in Regular Ruler
Time/Sampling Site Ruler
A. B
Scales in Time/Sampling Site Ruler

Ruler Mode - There are two styles of Ruler: (Regular Ruler, Time/Sampling Site Ruler)

Regular Ruler:

Presented in increments of 5.

Time/Sampling Site Ruler (default):

Presented in increments of 50us.

3. Customize Interface (cont'd)

Modify Waveform Height To modify Waveform Height, click Tools → Customize. & Correlated Setting

Waveform Height

Set the height of waveform (18-100) in chosen items at toolbar that will show the amplitude of the waveform.

Waveform Height

Customize	×			
Common Setup Toolbars Shortcut Kr	ey Auto Save			
Waveform Display Mode				
C Sampling Site Display C Frequency Display				
Time Display Ide time of waveform				
- Ruler Mode	-Waveform Setting			
C Regular Ruler	Waveform Height 30 💌			
Time/Sampling Site Ruler	Font Size 12 💌			
	Common Setup Toolbars Shortcut K Waveform Display Mode Sampling Site Display O Time Display © Ruler Mode Regular Ruler			

<u>Examples of</u> Waveform Height Waveform Height = 18

Waveform Height = 40

Bus/Signal	Trigger	Filter -20 =15 -10
🖌 💉 👬 AO		
🖌 🖌 👬		
🖌 🖌 🗚		
- A3 A3		
🖌 🖌 🖌		
🖌 🖌 🖌 🖌		
🖌 🗚 🔥		
# AT 1.7		
/ BO BO		
🖌 B1 B1		
🖌 B2 B2		
B3 B3		
🥖 B4 B4		
🖌 BS 85		
∕ 86 86		
/ B7 B7		
1 00 00	802	802

s/Signal	Trigger	Filter	-20 =15 -10
🖌 🗚 🖌			
🖌 AL - AL		×	
🥖 A2 A2	×	×	
🧭 🗚 🔥	12	8	
🖌 🗚 🗛	×	×	
🖌 AS AS	22	8	
🖌 AB AB	×	×	
# A7 A7	×	8	

Correlated Setting Select Auto-Close in the following figure.

Correlated Setting	
-	

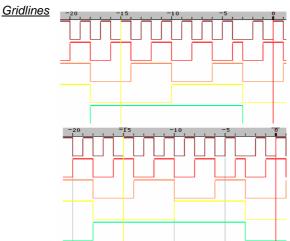
Correlated Setting	
Auto-Close	Open/Close Compression Warning
🔲 Show Gridline 🛛 🔽	Show the T Bar in the middle area
	Open/Close Double Warning
When the roller is moved waveform area will move	toward back, the Time Axis in the toward right.
Data Process What do you want to show running?	when you press the Stop during the
Keep the Present Data	C Read the Captured Data
-	Restore Defaults
	OK Cancel Help

3. Customize Interface (cont'd)

<u>An Example</u>	Bus/Signal	Trigger	Filter	<mark></mark>
for Auto-Close	Bus1			0X03 0 <mark>X</mark> 04 0X05 (
	🖌 🗛 🗛			
	🖌 🗛 📈		× -	
	🥖 A2 A2			
	🧹 A3 A3			
	🥒 🥖 🗛 🗛			
		1		A
	Bus/Signal	Trigger	Filter	987.25 - 986.309 - 985.
	Bus1			0X03 0X04 0X0
	🖌 AO A			
	🖌 🗛 🖌		•	
	🖌 A2 A			
	🖌 🗛 🗛			
	🖌 🖌 🖌 🗛			
		8778		

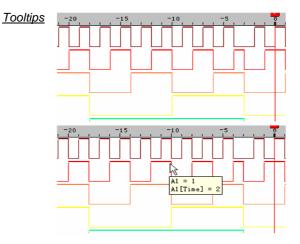
Auto-Close - With the cursor in the channel, when users try to drag a Bar, the Bar will stop at the approaching edge of the channel (Rising Edge or Falling Edge).

In the above example, when dragging the A Bar, the A Bar will stop at the Falling Edge of A1.



Show Gridline - The gridlines will be displayed on the waveform area.

3. Customize Interface (cont'd)



Show Tooltip - Leave the mouse over a waveform and the description will be shown.

Show the T Bar in the middle area - Show the T Bar in the middle of the Waveform Display Area after triggering.

Restore Defaults: The Waveform Display Mode, Ruler Mode, Waveform Setting, Correlated Setting and Data Process will return to the default setting.

User Interface (cont'd)

4. Auto Save

To save the captured data for a long time, users can use icons on the tool bar/box, or menu.

For the dialog box, go to **File** menu to click **Auto Save** or go to **Tools** menu to select **Customize** and select **Auto Save**.

<u>Auto Save Item of</u> <u>Customize</u>			Customize Common Setup Toolbars Shortcut Key Auto Save	×
Customize			Activate	
<u>Auto Save</u> on File Menu	New ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	Ctrl+N Ctrl+O Ctrl+F4	File Name: LA	
	📄 Save Save As 🛂 Auto Save	Ctrl+S	C:\My Documents\LA Data	
	🚾 Export Waveform 🥶 Export Packet List 📷 Capture Window	Ctrl+Shift+E Ctrl+C	Time Interval:	
	Language Frint Frint Preview	Ctrl+P		
	Recent File		OK Cancel Hel	
	Auto Save:		t activated; after activating, it keeps v Cancel to close it.	vorking and users
	Activate:	The default is not can choose Canc	t activated: after activating, it keeps a cel to close it.	active and users also
	File Name:		ne the file, the file name is defaulted can add a serial number for the file a	
	Save Path Nam	e: Users can enter	the path directly or choose the path	from the selected
		path button		
	Time Interval:	finished sampling users' requirement	ave function is activated, the time inte to the next activated sampling can l nts; the default is 1s, and the unit ca nute) and hr(hour).	be set according to
	Every Renewal:	When the repetitivi image will renew	ve run is activated, the waveform ima again and again.	age or the state
	Open the first fi		the Run: When the repetitive run fur v displays the first file and it isn't ren	

the waveform only displays the first file and it isn't renewed; when the repetitive run is stopped, the waveform still displays the first file.



D:\Backup\LA Data					
Ele Edit Vew Favori	tes Loc	is Help			20
🛛 😋 Back + 🕥 - 🤔	0	iearch 😥 Folders 🛄 •			
Address D:\Badup\LA D	ata				💌 🔁 60
File and Folder Tasks	*	LA(3).els ALS Fie BXB	LA(2).als ALS File 8 KB LA(4).als ALS File ALS File ALS File		
😂 Share this folder		Andre	BURNING S KB		
Other Places	\$	ALS Fie 8 KB			
Computer					
Details	¥				
5 objects				38.8 KB	y Computer

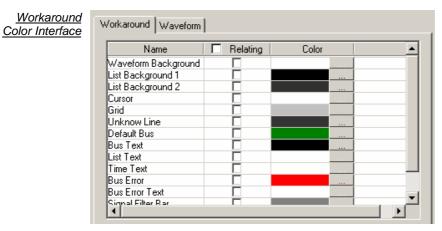
User Interface (cont'd)

5. Color Setting

Workaround and	Color Setting	X
Waveform Color Setting	Workaround Waveform	
	Name Relating Color	7
	Waveform Background	
	Preview 0 0 0 1 0 1 0 0 0 1 10 10 10 0 0 1 10 10 1 1 1 1 When being printed, the background is white. 0K Cancel Default Help	r

To modify Color, click **Tools → Color Setting**.

Workaround - Set the workaround color of the Logic Analyzer and the text.



5. Color Setting (cont'd)

Waveform Background:	The Logic Analyzer's Waveform Viewer Background Color.
List Background 1:	The Logic Analyzer's First Listing Viewer Background Color.
List Background 2:	The Logic Analyzer's Second Listing Viewer Background Color.

All optional items include the current color of Cursors, Grid, Unknow Line, Default Bus, Bus Text, List Text and Time Text (users can scroll the vertical wheel to view the selectable items).

Bus Error:Users can configure the color of Bus Error Data from the Color
Setting dialog box.Bus Error Text:Users can configure the color of Bus Error Text from the Color
Setting dialog box.

Relating: When users select one item to change the color of the item, and users want to change other items into the same color, they can select other items at the same time in the Relating column, then the selected items will be changed into the same color. So it is convenient for users to change many items into the same color once.

After the background is altered, corresponding color automatically changes according to the contrast ratio:

When users set the color for the workaround and select the option, the system will switch other colors automatically to become the contrast color.

When being printed, the background is white: When being printed, the background color is white.

 $\ensuremath{\textit{Waveform}}$ – Change the color of the Buses or signals on the waveform area.

<u>Waveform</u>	Color Setting				X
<u>Color Interface</u>	Workaround Wave	form			
<u></u>					1
	Name	🗌 🗖 Relating	Color	Linewidth	
	Bus1			1 pixel	
	AO			1 pixel	
	A1			1 pixel	
	A2			1 pixel	
	A3			1 pixel	
	A4			1 pixel	
	A5			1 pixel	
	A6			1 pixel	
	A7			1 pixel	
	BO			1 pixel	
	B1			1 pixel	
	B2			1 pixel	
	B3			1 pixel	
	B4			1 pixel	
	B5,			1 nivel	<u> </u>
	•)	
	Preview				
		0			
	10 10	10			
				• 1 ···	
		ОК С	ancel Defa	ult He	lp

Waveform: The channel color can be varied by users.

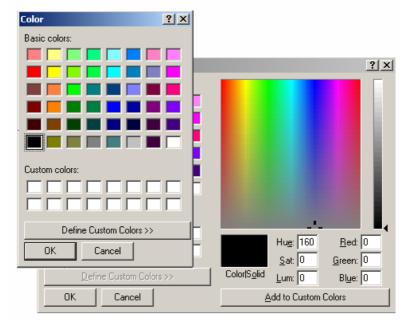
Linewidth: The linewidth can be adjusted by the users' requirements; there are three options which are 1pixel, 2 pixel and 3 pixel.

5. Color Setting (cont'd)

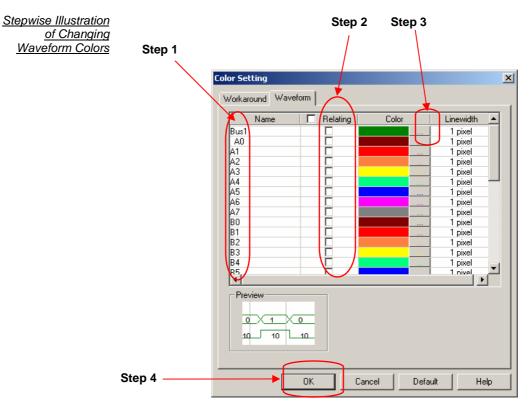
Modify Workaround Color

To modify the workaround color, click the color block shown in Fig 3-151. A Color panel, shown below will appear. Select a color shown on the panel or click on Define Custom Colors to create the desired color.

Color Panel with its advanced view



Modify Foreground color refers to the color of the output signal lines in the Waveform Display Area. Waveform Color Following fig. presents how to change colors of a signal or some signals. Repeat the following procedures if users need to change colors of many signals.



5. Color Setting (cont'd)

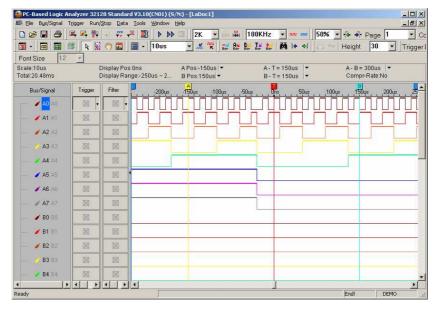
Step 1: Select several Optional Items.

Step 2: Select the corresponding items in the relating.

Step 3: Choose a color by following the method shown in Fig 3-154.

Step 4: Click OK to change their colors into the same, for example A1, A2, A3 and A4.

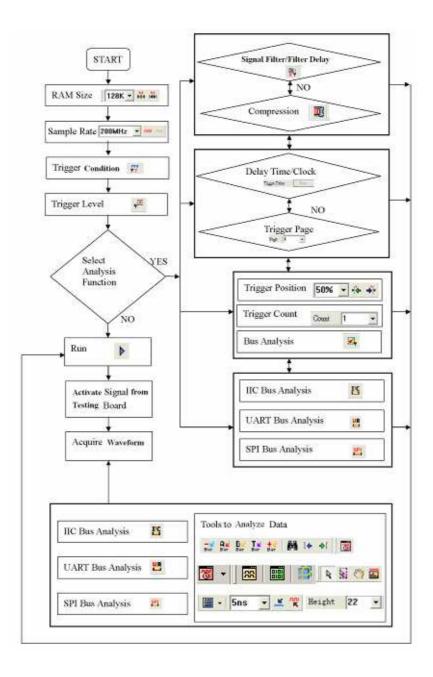
<u>An Altered Interface</u> <u>Sample to Be Used in</u> <u>Subsequent Chapters</u>



Here is a sample of an altered Logic Analyzer software interface which will be used for further demonstrations in subsequent chapters.

User Interface (cont'd)

6. Flow of Software Operation



Conclusion

Information demonstrated in this chapter is only for entrance level. There are more advanced approaches which may require fewer steps than those shown in this chapter. This chapter is meant to equip users with sufficient grounding of the Logic Analyzer's software interface.

Introduction to Logic Analysis

This chapter gives detailed instructions on performing two basic analysis operations and other advanced analysis applications with the Logic Analyzer. These two basic analysis operations are the Logic Analysis and the Bus Logic Analysis, which are fundamental to all further applications. The other advanced analysis applications are the I2C (Inter Integrated Circuit) Analysis and the UART (Universal Asynchronous Receiver Transmitter) Analysis, the SPI (Synchronous Peripheral Interface) Analysis, Compression, Signal Filter Setup and Filter Delay Setup, etc.. Logic Analysis is meant for a single signal analysis.

1. Logic Analysis

Basic Soft ware Setup of the Logic Analysis

Task 1. Clock Source (Frequency) and RAM Size Setup

> Step 1 Click icon or click Sampling Setup from Bus/Signal on the menu bar, the dialog box as shown will appear : Clock Source

ased Logic A	inalyzer	32128 50	andard ¥3.	LO(CN01)	(5/N:) - [LaDe	oc1]		
Bus/Signal	Trigger	Run/Stop	Data Too	s <u>W</u> indow	Help			
Sampling	a Setup .		0 1		2K		100KHz	- nn
Channel								
쫕다 Signal Fi				10us	* K	100 - 2 H	¥ 82 7¥ +2	## 1 4
EY Digitari		Sampii	ng Setup					×
Group in	ito Bus	Clock	k Source					
Ungroup	o from Bu	s As	nchronous C	lock ——				
		- 0	Internal Clo	:k]				
Expand			Frequency:	100KHz	-			
Collapse			r requeriey.	11001010				
Format I	Row		nchronous Clo					
Rename	,							
		- 0	External Clo					
			🖲 Rising B		Frequency:	100KHz		
			C Falling B	idge		(Min:0.001H	z, Max:100MHz)	
			Note: The e:	ternal clock	voltage level i	s the same as I	he port A trigge	r level
		Sam						
		RA	M Size		Compression	n Mode	Signal Filter -	
		RA	M Size: 2K	-	🔲 🗖 Data Co	mpression		1
		Ch	, annel number	will be			Signal Filter S	Setup
			ted to 32					
			1			1	1	1
		A	pply	OK	Cancel	Restore D	efaults	Help

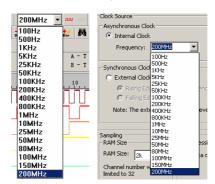
Step 2 Clock Source (Frequency) Setup

Internal Clock (Asynchronous Clock)

Click on **Internal Clock**, and then select the Frequency from the pull-down menu to set up the frequency of the device under test (DUT). The frequency of the Internal Clock must be at least four times higher than the frequency of the Oscillator on the DUT. Or, select the frequency **100MHz 100MHz 100MHz**

Connect the output pin of the oscillator from the tested board to the signal connector of the Logic Analyzer to measure it by using the internal clock of the Logic Analyzer.

<u>Clock Source</u> <u>Pull-down Menu</u>



External Clock (Synchronous Clock)

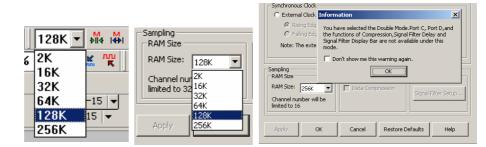
Click on **External Clock**, and then select "Rising Edge" or "Falling Edge" as the trigger condition of the DUT. In the Frequency column, type the frequency of the oscillator on the DUT.

The External Clock is applied when the frequency of the oscillator on the tested board exceeds the range of the internal clock of the Logic Analyzer. Connect the output pin of the oscillator on the tested board to the CLK pin of the Logic Analyzer.

Step 3 RAM Size Setup

Click on the RAM Size from the pull-down menu on the Sampling Setup dialog box.

RAM Size



The Double Mode is available for the 16128, 32128, 321000, 322000 Modules, and it is not available for the 16064 Module.

The relationship between RAM Size, Signal Filter Mode, Compression Mode and Channels

<u>RAM Size vs Signal Filter</u> <u>Mode, and RAM Size vs</u> <u>Compression Mode and</u> <u>Channels</u>

Status	I	Normal Mod	de		Double Mo	ode
Model No.	RAM Size/ Channels Compression Channels Available Signal Filter Mode		RAM Size/ Channel s	Channels Available	Compression Mode & Signal Filter Mode	
16064	2K ~ 64K	16 channels	Available	-	-	-
16128	2K ~ 128K	16 channels	Available	256K	16 channels	Disable
32128	2K ~ 128K 32 channels		Available	256K	16 channels	Disable
321000	2K ~ 1M	32 channels	Available	2M	16 channels	Disable
322000	2K ~ 2M	32 channels	Available	4M	16 channels	Disable

Task 2. Trigger Property

Trigger Property	 Bus Trigger Setup Channel Trigger Setu 	
	📲 Trigger Property	
	i _T Trigger Mark	Trigger Property
	🖵 Pulse Width Trigger N	Trigger Content Trigger Delay Trigger Range
	🔀 Don't Care	Ingger Serkerk [Ingger Delay] Higger Hange [
	High	Trigger Level
	Low	Port A
	🏋 Rising Edge	TTL 1.5 (V)
	Falling Edge	Port B (Min:1, Max:65535)
	Either Edge	TTL 🔽 1.5 (M)
	Reset	Port C
		TTL I.5 (M)
		Port D
		TTL 💌 1.5 (V)
		OK Cancel Default Help

Step 1 Click Jii icon or click Trigger Property from the Trigger on the Menu Bar. The dialog box

Step 2 Trigger Level Setup

will appear.

Click the pull-down menu of **Trigger Level** on Port A, B, C and D to select the Trigger Level as the voltage level that a trigger source signal must reach before the trigger circuit initiates a sweep.

There are four commonly used preset voltages for Trigger Level, TTL, CMOS (5V), CMOS (3.3V), and ECL. Users also can define their own voltage from -6.0V to 6.0V to fit with their DUT.

Port A represents the pins from A0 ~ A7 on the signal connector of the Logic Analyzer, and so do Port B, C and D. The voltage of each port can be configured independently.

Trigger Level-			Trigger Cour		
TTL	1.E PC-Base	d Logic A	nalyzer	~	×
Port B	0				
TTL	- T.E 🔼	Please e	enter a numb	er between -6	5.0 and 6.0
Port C					
TTL	• 1.5		OK		
Port D					
User Define 🔻	· 22 (V)	I			

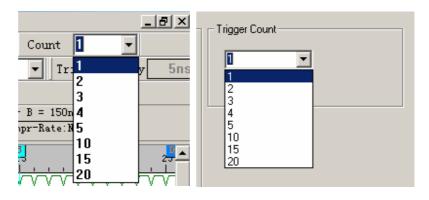
Trigger Level Error

Step 3 Trigger Count

Type the numbers or select the number from the pull-down menu of the Count 1 on the Tool Bar or click the pull-down menu of the **Trigger Count** on the Trigger Property dialog box.

The system will be triggered at the position where the Trigger Count is set as shown :

<u>Trigger Count</u> Pull-down Menu





Eile Bus/Signal				Vindow Help	-								
	📖 🖬 🖗	* * *	1 (A 1))))))))))	• • •		M 1401				👎 🐳 F		💌 Cou	
	🚳 🛛 🔊	۱ 🖑	i - 12	20.6234451	K K	Bar Bar Ba	er Bar Bar	👪 l🔶 🦻	41 ^{0.0}	Height	30 -	Trigger De	ela <mark>y 51</mark>
ont Size 12	the second second												
cale:20.623445u: otal:655.36us	5			450552us 27.675us ~	280/05/54/18	322.635us 322.485us		A - T = 32 B - T = 32	2.635us			50ns 🔻 Rate:No	
Bus/Signal	Trigger	Filter		91.018344y-187	90112us-84	1783896	8 333328.0	121 4505520-22	4 567776us 3	27 685us	430 8022240	533 919448uF	37 036672
🖌 🗛	Z •	- 12		41.9140 Jul 191							<u></u>		<u></u>
🖌 A1 A1													
— 🥖 A2 A2		×											
- 🧭 A3 A3		23											
🖌 🗛 🖂		28											
🖌 A5 A5		\boxtimes											
— 🖌 🖌 🖌		×											
— 🖉 A7 A7													
BO BO	1521	152											

<u>Trigger Count</u> Screen Shot 2

County of County			rd V3.10(CN01) (5/N:00000000001) - [LaDoc1]
Eile Bus/Signal T		and the second se	a Iools Window Help
	nių 🕰 🖗	* YT Y	📲 🔟 🕨 🚺 128K 🚽 👬 👬 200MHz 👻 nu 🛛 50% 👻 🎋 Page 1 🔮 Count 5
🐻 - 📧 🧃	R R	🖑 🛍	📓 - 20.623445 - 🦝 👯 🔐 🕵 🕵 🛤 🖬 🕪 📢 👝 😁 Height 30 👻 Trigger Del 🔚
Font Size 12	*		
Scale:20.623445us			/ Pos:0ns A Pos:-322.635us ▼ A - T = 322.635us ▼ A - B = 150ns ▼
Total:655.36us		Display	/Range:-327.675us ~ B Pos:-322.485us ▼ B-T= 322.485us ▼ Compr-Rate:No
Bus/Signal	Trigger	Filter	
🖌 🗛 🗛	Z		
🖌 A1 A1			
🖌 A2 A2			
🏹 🗛 🖂			
🖌 🗛 🖂			
🖌 A5 A5			
🖌 🗚 AS		×	
— / A7 A7			
🖌 BO BO			

Step 4 Trigger Page/ Delay Time and Clock

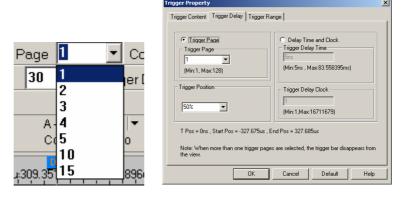
The Trigger Page and the Delay Time and Clock can't be applied at the same time.

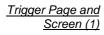
1. Trigger Page:

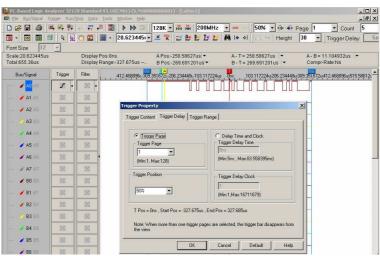
Click **Trigger Page**, then type the numbers or select the numbers from the pull-down menu of the Page Page on the Tool Bar or click the pull-down menu of the Trigger Page on the "Trigger Delay" page of the Trigger Property dialog box as shown in following figs. The selected page numbers will be displayed on the screen.

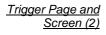
The Trigger Bar (T Bar) will not be displayed when the setup of the Trigger Page is more than 1.

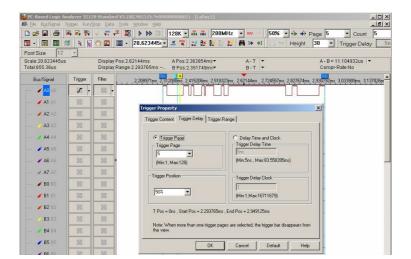
Trigger Page











2. Delay Time and Clock

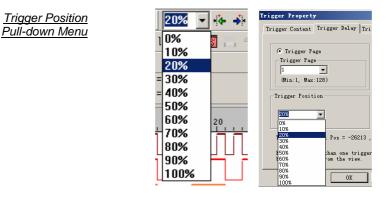
Click the **Delay Time and Clock**, then type the numbers into the column of the Trigger Delay Time or type numbers into the Trigger Delay Clock at the "Trigger Delay" page of the Trigger Property dialog box as shown in Fig 4-11. Or type the numbers into the column of Trigger Delay Trigger Delay Trigger Delay 5 on the Tool Bar. The system will display the Start of the waveform.

The formula of Delay Time and Clock is "Trigger Delay Time = Trigger Delay Clock * (1/ Frequency)".

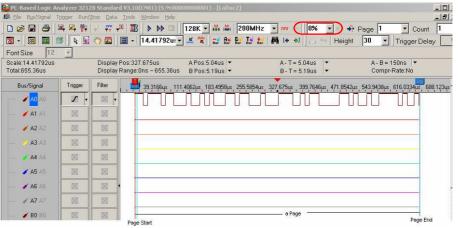
To use the compression mode, the < Delay Time and Clock > will be unavailable.

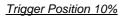
Step 5 Trigger Position Setup

Type the percentages or select the percentages from the pull-down menu of the 20% on the Tool Bar or click the pull-down menu of the Trigger Position on the "Trigger Delay" page of the Trigger Property dialog box as shown in following Figs. The selected Trigger Position percentages will be displayed on the right side of the screen of the system.



Trigger Position 0%





	alyzer 3212	28 Standard	d ¥3.10(CNO1) (S/N:00	00000001) - [LaDoc2]		
Elle Bys/Signal 1	rigger Run/	Stop Data	Tools Window Help			
🗋 😂 🖬 🎒	🙀 🕰 🏘	Y	• • • •	128K 🕶 👬 👬 200MH	lz 👻 📶 🚺 🖬 😽 🚽	Page 1 🗾 Count 1
	R R	(*) 🗰	📓 🖌 🛛 14.41792u:		💒 🎮 14 🔊 📊 Heigh	t 30 🔹 Trigger Delay 📃
Font Size 12	T.					
Scale:14.41792us			Pos:262.145us	A Pos:-60.49us 🔻	A-T=60.49us 💌	A-B=150ns ▼
Total:655.36us		Display F	Range:-65.53us ~ 5	B Pos:-60.34us 🔻	B - T = 60.34us ▼	Compr-Rate:No
Bus/Signal	Trigger	Filter	-26.21344s 4	5.8762us , 117.9658us , 190.0554	us, 262.145ys, 334.2346us, 406.324.	2µs, 478,41,38µs, 550,50,34µs, 622,593µs
🖌 🗚 🗛		- 12				
🖌 A1 A1					and the second of the second of	
🧪 A2 A2						
— 🥜 АЗ АЗ						
🖌 🖌 🗛						
🧭 A5 A5						
🖌 A6 A6						
- 🖌 A7 A7		X				
¥ 00.00	808	8528	109/		999	

Trigger Position 70%

			rd V3.10(CN01) (5//k0000000000) - [LaDoc2]
🗅 🔗 🖬 🥔	₩ ₩ ₩₽	φ¹ ^{μνν} φ	📲 🔟 🕨 🕨 🔲 128K 🔻 👬 🎬 200MHz 💌 🚾 🚺 70% 💌 🤣 🐳 Page 1 💌 Count 1
🐹 - 🐹 📰	🥵 🗚 📓	<) 🛅	📓 - 🛛 14.41792u: 👻 😹 💘 🔜 🔐 🔛 😹 🕌 14 剩 📭 Height 🛛 🔻 Trigger Delay 🗌
Font Size 12	~		
Scale:14.41792us Total:655.36us			/Pos:131.07us A Pos:453.705us ▼ A - T= 453.705us ▼ A - B = 150ns ▼ Range:458.745us ~ B Pos:453.555us ▼ B - T = 453.555us ▼ Compr.Rate:No
Bus/Signal	Trigger	Filter	419.4284µs, -347.3388µs, -275.2492µs, -203.1596µs, -131.07µs, -58.9804µs, 13.1092µs, 85.1988µs, 157.2884µs, 229.378
🖌 🗛 📈			
🖌 A1 A1		X	
🥢 🎸 A2 A2			
🧭 🗛 🖂	×	×	
🕜 🗛 🗛			
🖌 A5 A5	X		
🖌 A6 A6			
/ A7 A7			
80 80	152	521	

Step 6 Trigger Range Setup

Click **Trigger Property** from the Trigger on the Menu Bar. Then, Click the Trigger Range, the dialog box will appear as shown in following Fig.

This function is mainly for the range control for the saved files after triggering. According to the procedures of the range control, users can start the save of data according to the requirement of its time and times to get the standard of data statistic status.

Trigger Range

Trigger Property	X
Trigger Content Trigger Delay	Trigger Range
Activate Trigger Range	
Time Sample	1 minute 💌
	OK Cancel Default Help

1. Trigger Range: The default is not activated.

2. There are "Time Sample" and "Frequency Sample" in the part of Range Setting; the default is "Time Sample". The units of Time Sample are 'second', 'minute', 'hour' and 'day'. The unit of Frequency Sample is 'times'. Users can set the value by themselves in the editor box.

Task 3. Bus Trigger and Trigger Mark Setup

<u>Trigger Menu</u>

Step 1	Click icon or click Bus Trigger Setup and Trigger Mark from the Trigger on the Menu Bar.
-	The menu is shown as follows :

6	Bus Trigger Setup
۰.	
T	Channel Trigger Setup
ľ	Trigger Property
÷	Trigger Mark
,	Pulse Width Trigger Module(Option)
3	Don't Care
	Hi gh
	Low
đ	Rising Edge
5	Falling Edge
ġ	Either Edge
	Reset

Step 2 1.

Bus Trigger Setup

÷ •

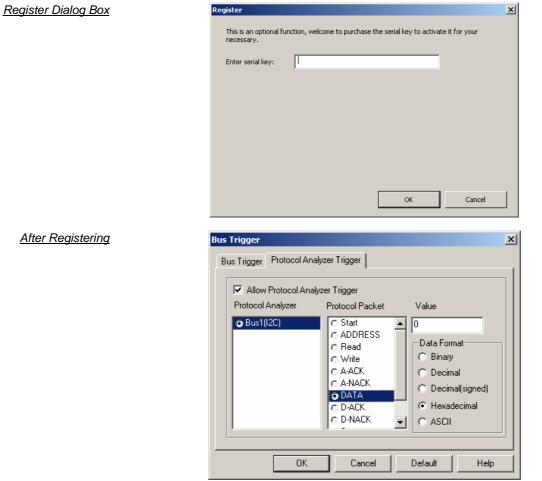
Bus Trigger Dialog Box

s Trigger			>
Bus Trigger Protoco	I Analyzer Trigger		
Bus Name	Operator	Value	
Bus1	- =	▼ 1	
Data Format	_		
C Binary	🔿 Decimal	C Decimal(signed)	
Hexadecimal	C ASCII		
	JK Cance	el Default H	elp

- The Bus Name item can be selected from the pull-down menu (It only displays the Bus name),and also the Decimal(signed) Mode is added.
 - 2. Protocol Analyzer Trigger Setup
- This function can be used in the Modules, 16064, 16128, 32128 and 321000 after registering. And for the 322000, it is not necessary to register as it can be used for free. Before registering, the button "OK" in the Protocol Analyzer Trigger dialog box is the button, "Register"; when users press this button, Register, a Register dialog box will pop up. Then users need to enter the correct Register Code so that they can use this function, Protocol Analyzer Trigger.

Before	Registe	ring

us Trigger Protocol Ar	alyzer Trigger	
Protocol Analyzer	Protocol Packet	Value Data Format Binary Decimal C Decimal(signed) Hexadecimal ASCII



Allow Protocol Analyzer Trigger: When it is selected, the Protocol Analyzer Trigger function is activated. And then users can set Protocol Analyzer, Protocol Packet, Value and Data Format.

Protocol Analyzer: It only displays the name of Protocol Analyzer and only one name can be selected.

Protocol Packet: It is displayed according to the packet in every Protocol Analyzer.

Value: The value needs to be entered in the frame, and the data mode can be selected by users according to their requirements; the default is Hexadecimal! When a value can be input in the selected protocol analyzer data, the frame can be enabled! Or, the frame will be disabled! For example: Protocol Analyzer I2C, when the protocol packet is DATA, the frame can be used; to the contrary, when the protocol packet is START, the frame is disabled.

Data Format: The displayed value mode can be selected! There are five options: Binary, Decimal, Decimal(signed), Hexadecimal and ASCII.

After Registering

Step 3 Trigger Mark Setup

To find the item in the Bus better, users can activate the Trigger Mark function after starting Bus Trigger; the trigger mark is shown with T Bar. According to the number of the trigger position, the T Bar is displayed in order T0, T1, T2, T3, T4...and the color is red as the image below:

1. Bus: The trigger condition is "0"; the red T Bar displays the trigger condition in order.

<u>Bus Trigger Mark</u>	Bus/Signal	Trigger	Filter		. 4	1	9, 58	31 39	12 0. 06	3 58.5	94	78.125	97, 656	6 19	117.188	130	5. 719	1	56.25 175.1	78
	Bus1	•		OX0	00	OXO)	Ĵ	oxo X	X	охо)		xo ()	OX0)	Ĵ	OXO X	1/	хо)(0X0	_
	🖌 🗛 AC	N			\square			ĺ	1		L			٦		L	ĺ			_
	🖌 🖌 A1																			
	🥖 A2 A2																			
	A3 A3																			
	🖌 A4 A4	X		•																
	🖌 A5 A5																			
	🖌 🖌 A6		X																	
	🖋 A7 A7																			
	🖌 BO BO																			
	🖌 B1 B1																			-
																				-

2. Protocol Analyzer (I2C): The trigger condition is "Data=0"; the red T Bar displays the trigger condition in order.

Protocol Analyzer	Bus/Signal	Trigger	Filter	-20	15 -10	-5 0	5 10		25
<u>Trigger Mark</u>	Busi (I2C)		⊗ •	OXOO 🛛	oxoo 💧	oxoo ≬	0000	0X00	0X00
	🖌 🖌		\otimes						
	🖌 A1 A1		\otimes						
	/ A2 A2		\otimes						
	🥖 A3 A3		\otimes						
	🖌 A4 A4		\otimes						
	🖌 A5 A5		\otimes						

The Trigger Mark function is available for the 322000 Module, and it is not available for the 16064, 16128, 32128, 321000 Modules.

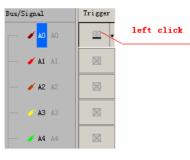
Task 4. Bus/Signal Trigger Condition Setup

Highlight a designated signal, and then set its required trigger condition.

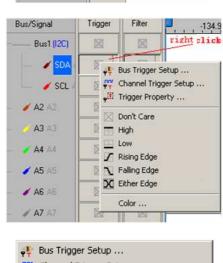
1.Left click is to set the signal trigger condition as shown in Fig 4-22.

- 2.Right click is to set the signal trigger condition as shown in Fig 4-23.
- 3. Click **Trigger** on the Menu Bar and choose a trigger condition from the list of triggers as shown :

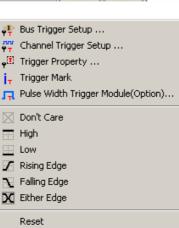
Left Click on Trigger



Right Click on Trigger



<u>Trigger Menu</u>



Task 5. Run to Acquire

Click I Icon to View All

the Data

Data

1. Single Run

Click the Single Run i icon from the Tool Bar or press **START** button on the top of the Logic Analyzer (or press F5), then activate the signal from the DUT to the Logic Analyzer to acquire the data shown in the waveform display area.

2. Repetitive Run

Click the Repetitive Run is icon from the Tool Bar, then activate continuous signal to the Logic Analyzer to acquire the repetitive data, and then click the Stop icon to end the repetitive run.

Click icon to view all the data, and then select the waveform analysis tools to analyze the waveforms.

 Qata
 Loois
 Window
 Help

 200MHz

 200MHz

 200MHz

 50% - 🚸 🔶 Page 1 • Coun R 30 · • 1 - 31 **1** rigger ale:3.68094 A Pos:-83.878485ms Pos:-225.68u A - T = 83.878485ms A - B = 150ns -Compr-Rate:255.303 Bus/3 Trigge 8us 18.179047m 🖌 🗚 5 / A1 / A2 A3 8 A4 🖌 A5 / / A6 / A7 🥖 BO 🗄 🥖 B1 🗄 🥖 B2 🛙 83 B 🖌 84 B **6** 85 B / 86

3. Stop to end Run

Click the Stop **I** icon to end the Run.

If the status is "Waiting..." with no signal outputting as shown in Fig 4-26, click the Stop icon to end the Run; check the setup again, and try the run process again.

Waiting Status



Introduction to Logic Analysis (cont'd)

This chapter presents detailed instructions about logic analysis with a set of grouped signals, which is known as Bus Logic Analysis.

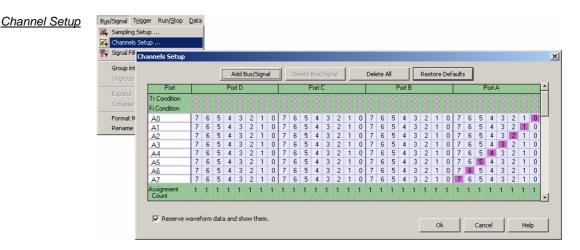
2. Bus Logic Analysis

Basic Software Setup of the Bus Logic Analysis

- Step 1 Set up the RAM Size, Frequency, Trigger Level and Trigger Position as described in section 1
- **Step 2** Group signals into a Bus.

Click Channels Setup on Bus/Signal of the menu bar, or click 🛃 icon.

The dialog box will appear :



Rename the Bus and set up the channels of the Bus as shown :

|--|

Port				Por	τD				P	ort	Å			
Tr.Condition		\mathbb{X}	\mathbb{X}	\mathbb{X}	\mathbb{X}	-	\mathbb{Z}	\mathbb{X}	\mathbb{X}	\mathbb{X}	\mathbb{X}	\mathbb{X}	\mathbb{X}	
Fi.Condition		\mathbb{X}	\mathbb{X}	\mathbb{X}	\mathbb{X}		\mathbb{X}	X	X	X	X	\mathbb{X}	\mathbb{X}	X
A0	7	6	5	4	3		7	6	5	4	3	2	1	0
A1	7	6	5	4	3		7	6	5	4	3	2	1	0
A2	7	6	5	4	3		7	6	5	4	3	2	1	0
Bust	7	6	5	4	3		7	6	5	4	3	2	1	0
A4	7	6	5	4	3		7	6	5	4	3	2	1	0
A5	7	6	5	4	3		7	6	5	4	3	2	1	0
A6	7	6	5	4	3		7	6	5	4	3	2	1	0
Α7	7	6	5	4	3		7	6	5	4	3	2	1	0
Assignment	1	1	1	1	1		3	3	3	1	1	1	1	1

1.Click the column with blue, then type the given name of the Bus, and then press **Enter** to confirm it.

2.Go to the relative channels as shown in the example and go to numbers 0, 1, 2, 3, which are located on column A and row Bus1. Click them to become purple, then set these segments of channels.

3.Click **OK** to get the result as shown in area 1.

2. Bus Logic Analysis (cont'd)

Channels Setup Window

Bus/Signal	Tri	igger Fil	ter	P			-2	0.			▲ =1:	5			-10				5			-	<u> </u>			5				10					
AL AL	Ch	annels Set	ap		_	_																	_		_	_	_	_							x
🥖 A2 A2		Fort			\subseteq	Por	dd B		Signa	el.	2	_	_	Bus/		nal			Dele	ete A		ort		Res	tore	Def	ault)	ort	4			_	• 1
/ A3 A3	\geq	Ter Condi Ci	on 2	s iz								3																			~	26	North	>	
	5	**		ß	_	4	3)	×× 1	0	7	6	5	4	3	2	1	0	7	KuiX B	5	4	3	2	×× 1	0	7	6	5	4				3	
Busi 1		A2 A3 Rus1	7	6	5	4 4 4	3 3 3	2 2 2	1	0	777	6 6 6	5 5 5	4 4 4	3 3 3	22	1 1 1	0	777	6 6 6	5 5 5	4 4 4	3 3 3	2 2 2	1	0	7	6 6 6	5 5 5	4	3	22	1	d	
🖌 🖌 AC		Bus1 A4 A5	1	6	5	4 4 4	3	2 2 2	1 1	6	7	6	5	4 4 4	3	2	1 1 1	0	7 7 7	6 6	5 5 5	4 4 4	3	2 2 2	1 1	0	7	6 6	5	4	3	2	1	0	
🖌 🖌 A1		A6 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	
A2 A2	K	Assignment Count	4	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	2	2	2	1	+
🖌 💦 A3		Reserve	wav	eforr	m dat	a an	d sha	ow ti	hem																oł	(1		Can	cel	1		Hel	p	-
- 🖌 A4 A4											_											_		_	_	_			_	_	_	_			

d Channels Setup

In the dialog box of Channels Setup, there isn't only Add Bus/Signal, but also Delete Bus/Signal, Delete All, Restore Defaults provided.

1.Delete Bus/Signal: Firstly highlight the Bus or channels on area 6 of Fig 4-29, then click Delete Bus/Signal to delete them.

2.Delete All: Click Delete All to delete all Bus/signals on area 6 of Fig 4-29.

3.Restore Defaults: Click Restore Defaults to restore the dialog box of Channels Setup.

Step 3 Trigger Condition Setup

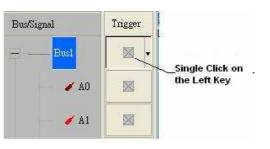
Highlight the Bus which will be triggered then click
 et icon or select Bus Trigger
 Setup from the Trigger of the Menu Bar, the dialog box as shown in Fig 4-30 will
 appear.

<u>Bus Trigger Setup</u>	Bus Trigger	×
	Bus Trigger Protocol Analyzer Trigger	
	Bus Name Operator Value	
	Bus1 🗨 = 🔽 1	
	Data Format	
	C Binary C Decimal C Decimal(signed)	
	Hexadecimal O ASCII	
	OK Cancel Default Help	

1

Left click on Trigger column of the Bus.

Trigger Column



2. Bus Logic Analysis (cont'd)

2. Set Binary, Hexadecimal, Decimal, Decimal Signed or ASCII as the Data Format of the Bus to represent the value (see Fig 4-30).

3. Set "=" and "Don't Care", and type the value of the Bus into Value column to set the trigger condition of the Bus.

4. Click **OK** to confirm the settings.

- **Step 4** Click **Run** and activate the signal from the tested board to the system to get the result as shown below :
 - Click discrete icon to view all data, and then select the waveform analysis tools to analyze the waveforms.

Set Value is "2" as Hexadecimal, and set Operator equals to "=", then click OK. Click Run and activate the signal from the tested board to the system to get the result as the trigger happens on 0X2.

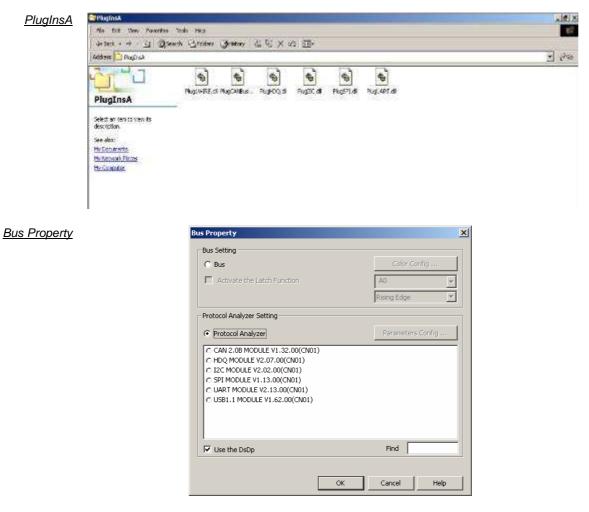
3 • 3 1	8 A 51	0.5	📓 • 3.6323806 • 🗶 💘 😹 😫 🔛 🗶 🗰 🗰 🗰 😽 👘 🔢 🚼 • Height 30 • Trigger Delay 🚺
Scale 27 5301532 Total 131072			ay Pos: 343 A Pos: 64527 * A - T = 64527 * A - B = 30 * ay Range - 345 - 1034 B Pos: 64497 * B - T = 64497 * Compr-Rate No
Bus/Signal	Trigger	Filter	2007 465 69 815 - 67 836 205 487 343 138 480 798 618 439 756 09 193 741 1031 291
e Buil	82 .	- 10	Internet and Internet American
— 🖌 A0 🖻	-	10	Ous Trigger
— 🧹 A1 🗠	=	- 201	But Tripper Protocol Analyzer Tripper
- A6	- E	- IR	But Name Dossator Value
/ A2 /C	- 22	- 30	Bun vane Upsidor Vale
— 🍝 🗛 🗤	- 22	- 22	
- 🖌 🗚 斗	間	99	Data Format Decimal C Decimal C Decimal C Decimal
- 🖌 A5 🕫	() ()	- 101 I	G Hexadecinal C ASCI
- # A7	8	超	
- 🖌 80 km	35	80	
🖉 🖉 🖬 🕅	8	8	
- 🖉 82 au	30	- 30	OK Cancel Delaut Hep
and the second second		-	The second secon

Introduction to Logic Analysis (cont'd)

3. Plug Analysis

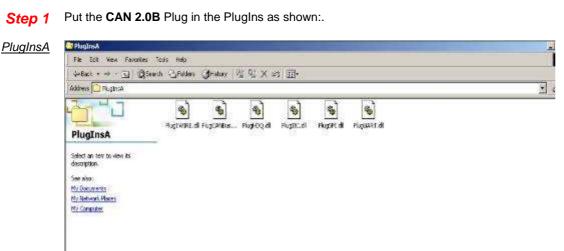
Protocol Analyzer operates in the form of Plug; every Protocol Analyzer has a plug, per plug is independence modularization. One Protocol Analyzer plug can analyze many Buses at the same time, however, because the independence of every plug, the Protocol Analyzer plug only supports I2C, UART, SPI, HDQ, 1-WIRE, CAN 2.0B at present. In the future, it will support more Buses, and when the Protocol Analyzer renews, it only needs to download the new Protocol Analyzer plug to cover the old Protocol Analyzer plug; the speed is very fast.

Operating Instructions: There are PlugIns data file in the position of installing LA software. All Protocol Analyzer plugs which are used at present are put in the data file, the DLL file can be added or deleted in the content, and in the Bus property, all Protocol Analyzer plugs that can be used at present can be seen as the figure below:



Every Logic Analyzer Module can provide some basic Protocol Analyzer plugs. When users need to use the analysis which is not provided by the basic Protocol Analyzer plugs, you can purchase from our company, and then, you can get this Protocol Analyzer plug and the register code.

3. Plug Analysis (cont'd)



Step 2 St

2 Select CAN 2.0B in the Protocol Analyzer list.

Bus Property

C Bus	Color Config
Activate the Latch Function	A0 Rising Edge
Protocol Analyzer Setting	
Protocol Analyzer	Parameters Config
CAN 2.08 MODULE V1.32.00(CN01)	
 HDQ MODULE V2.07.00(CN01) I2C MODULE V2.02.00(CN01) 	
© SPI MODULE V1.13.00(CN01)	
© UART MODULE V2.13.00(CN01)	
© USB1.1 MODULE V1.62.00(CN01)	
······	
✓ Use the DsDp	Find

Step 3 Click Parameters Configuration button, select Register and enter the Serial Key.

Protocol Analyzer CAN 2.0B Register dialog box

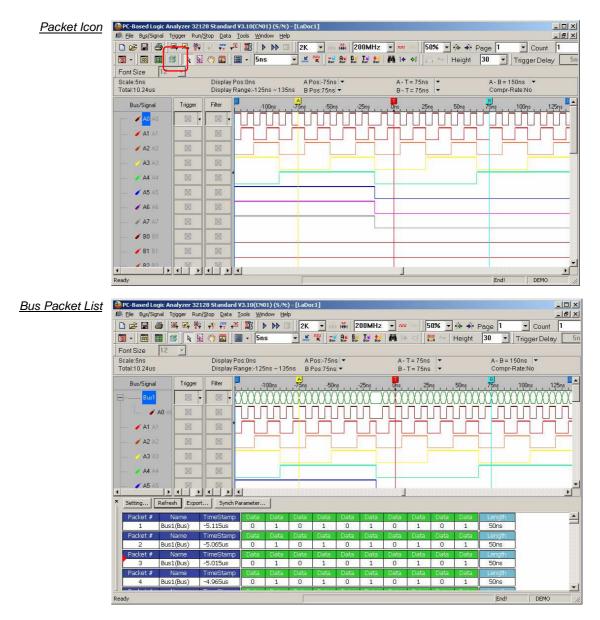
P	ROTOCOL ANALYZER CAN 2.0B	×
	Configuration Packet Data Format Register	
	The CAN 2.0B protocol analyzer decoding function is an optional purchased item. Welcome to purchase its serial key to activate this function for your necessary.	
	Enter serial key:	
	Register Cancel Default Help	

Introduction to Logic Analysis (cont'd)

4. Bus Packet List

Bus Packet List is a graphics list which is used for doing Statistics and showing Bus Packet List. It is visual and direct, especially for I2C, USB 1.1 and CAN 2.0B. When there is a packet list, it gets twice the result with half the effort to check the data. Packet List has its startup button in Toolbar. After starting it, it will show a small window under the waveform window. Users can alter its size to find more data.

If you want to learn more about the Bus Packet List, please refer to the Specification of the Protocol Analyzer.



Packet List has a setup window; users can set up the Packet List according to their requirements. Setting Bus Packet Length in dialog box is only used for doing Bus Statistic. Users can define how long the time is as a data packet to add the export function. See the following figure.

Packet List Setting

5etting	×
Bus Select	Data Format
⊌Bus1(Bus)	C Binary C Decimal C Decimal(signed) C Hexadecimal C ASCII
<. >	Bus Packet Length Min: 1 10 Max: 2048
Packet Item	TimeStamp Length Data
ОК	Cancel Default Help

Bus Packet List	BUS Packet	List													×
	Setting	Refresh Expo	rt Synch Pa	arameter											
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	1	Bus1(Bus)	-1023	0	1	0	1	0	1	0	1	0	1	10] —
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	2	Bus1(Bus)	-1013	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	3	Bus1(Bus)	-1003	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	4	Bus1(Bus)	-993	0	1	0	1	0	1	0	1	0	1	10]
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	1
	5	Bus1(Bus)	-983	0	1	0	1	0	1	0	1	0	1	10]
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	6	Bus1(Bus)	-973	0	1	0	1	0	1	0	1	0	1	10]
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	7	Bus1(Bus)	-963	0	1	0	1	0	1	0	1	0	1	10	

1. View Specifications

Packet #, Name and TimeStamp can be selected to display from the Packet List Setting dialog box.

Packet #: List the order of Packet.

Name: Display the name of Packet, or the Filter Display Bar.

TimeStamp: It is the starting point of the Packet.

The rest name and content are supplied by Plug.

Packet #	Name	TimeStamp	Address	Read	A-NACK	DESCRIBE	
1	IIC BUS(I2C)	477	7F	Read	A-NACK	ADDR NACK	
Packet #	Name	TimeStamp	Address	Read	A-NACK	DESCRIBE	
2	IIC BUS(I2C)	5231	7F	Read	A-NACK	ADDR NACK	
Packet #	Name	TimeStamp	Address	Read	A-NACK	DESCRIBE	
3	IIC BUS(I2C)	9165	7F	Read	A-NACK	ADDR NACK	
Packet #	Name	TimeStamp	Address	Read	A-NACK	DESCRIBE	
4	IIC BUS(I2C)	16367	7F	Read	A-NACK	ADDR NACK	
Packet #	Name	TimeStamp	Address	Read	A-NACK	DESCRIBE	
5	IIC BUS(I2C)	20290	7F	Read	A-NACK	ADDR NACK	

Protocol Analyzer I2C Packet List

Setting: It is used to open Packet List Setting dialog box.

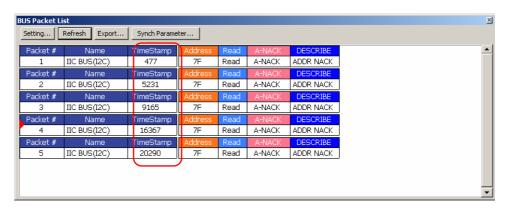
Refresh: Press this button, the list view can renew automatically.

Export: Export the workspace into Text (*.txt) and CSV Files (*.csv).

Synch Parameter: Open the synch parameter setting dialog box and activate the packet and waveform synch function.

2. Display Protocol Analyzer Packet in Order

The below view are Protocol Analyzer I2C; the packet is determined by the position of the TimeStamp.



When the Display Bar of Signal Filter is activated, the Bar should be displayed in the Bus Packet List, and also the TimeStamp, Address and length of the Bar will be displayed.

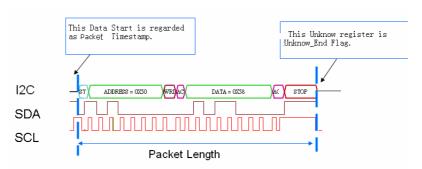
3. Packet Idle and Packet Length

Packet Idle: Packet interval time Packet Length: Packet time length

When those above two items are to be displayed, it only chooses one of them to display, which is

controlled by Plug.

Because it is impossible that every Protocol Analyzer packet has registered timestamp and end, we add two special Unknow_Flag to judge the timestamp and end of the packet which are Unknow _Start_Flag and Unknow_End_Flag.



Because I2C has started as the Packet TimeStamp, it does not need to use Unknow_Start_Flag as the start.

Protocol Analyzer I2C Packet Length

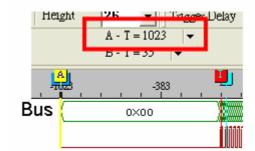
4. Bus

Bus Packet List	BUS Packet	List													×
Dus r donot List	Setting	Refresh Exp	ort Synch Pa	arameter											
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	1	Bus1(Bus)	-1023	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	2	Bus1(Bus)	-1013	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	3	Bus1(Bus)	-1003	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	4	Bus1(Bus)	-993	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	5	Bus1(Bus)	-983	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	6	Bus1(Bus)	-973	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	7	Bus1(Bus)	-963	0	1	0	1	0	1	0	1	0	1	10	

Packet Length and Packet Idle Length

Packet's TimeStamp is the start of Bus Data; the default length is controlled by the setting dialog box. If the input packet length isn't the end of data. The software will prolong the length of Packet to end the data automatically as the figure below.





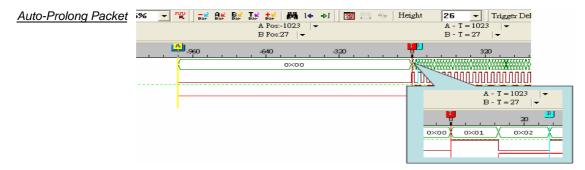
This Fig. is a Bus; its first data is 0x00, and its length is 1023. If users input 20 as the Bus length. But 20xaddress is not the end of this data, so the software will prolong the length of the Packet to 1023 automatically.

Packet End



This Fig. is a Bus. If the Start of the packet is T Bar and the set Bus length is 20, but the data 0x02 isn't the end, at that time, the Packet will be prolonged to the end dot automatically, that is to say, the Address 27 (B bar) is the End of the packet.

The above two data are made consecutively as the figure below.



	BUS Packet	List													×
<u>Bus Packet List</u>	Setting	Refresh Expo	rt Synch Pa	rameter											
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	1	Bus1(Bus)	-1023	0	1	0	1	0	1	0	1	0	1	10] — [
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	2	Bus1(Bus)	-1013	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	3	Bus1(Bus)	-1003	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	4	Bus1(Bus)	-993	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	5	Bus1(Bus)	-983	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	6	Bus1(Bus)	-973	0	1	0	1	0	1	0	1	0	1	10]
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	7	Bus1(Bus)	-963	0	1	0	1	0	1	0	1	0	1	10	

Here Protocol Analyzer Packet will be explained in the following plug.

5. Packet and Waveform Synchronization

The Packet List is displayed as the figure below:

For the convenience of fast corresponding between packet data and waveform data, and what is more, in order to make it easier for users to look up data, we add the Packet and Waveform Synchronization function.

In order to operate conveniently, we add a Synch Parameter button on the BUS Packet List as the image below:

<u>Synch Parameter on the</u> BUS Packet List	BUS Packet	List Refresh Expo	wt Sunch D	arameter											×
<u>DOG FUCKOT EKST</u>				0											
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	1	Bus1(Bus)	-1023	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	2	Bus1(Bus)	-1013	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	3	Bus1(Bus)	-1003	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	4	Bus1(Bus)	-993	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	5	Bus1(Bus)	-983	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	6	Bus1(Bus)	-973	0	1	0	1	0	1	0	1	0	1	10	
	Packet #	Name	TimeStamp	Data	Data	Data	Data	Data	Data	Data	Data	Data	Data	Length	
	7	Bus1(Bus)	-963	0	1	0	1	0	1	0	1	0	1	10	
															-

At the same time, a Synch Parameter Setting dialog box is added.

<u>Synch Parameter</u> Setting Dialog Box

Synch Parameter Setting	×
Activate Packet and Waveform	Synch
Synch Point of Packet List	Synch Point of Waveform Area
• Тор	C Left
C Middle	 Middle
	OK Cancel

Activate Packet and Waveform Synch: The default is not activated.

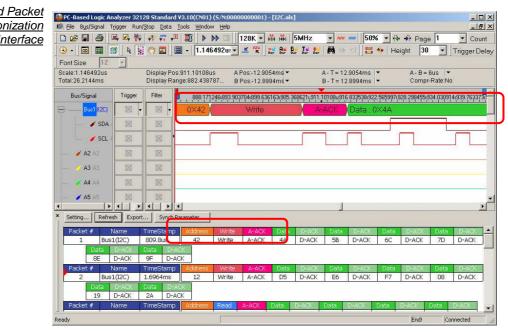
VII - 102

- **Top:** When the Packet and Waveform Synch is activated, the synch point in Packet List is the top packet segment which is displayed by list.
- **Middle**: When the Packet and Waveform Synch is activated, the synch point in Packet List is the middle packet segment which is displayed by list.
- Left: When the Packet and Waveform Synch is activated, the synch point in the waveform area is the left packet segment which is displayed by waveform.
- **Middle**: When the Packet and Waveform Synch is activated, the synch point in the waveform area is the middle packet segment which is displayed by waveform.

Activate Packet and Waveform Synch, select Top and Left.

<u>Synch Parameter</u> Setting Dialog Box	Synch Parameter Setting	×
	Activate Packet and Waveform	Synch
	Synch Point of Packet List	Synch Point of Waveform Area
	🖲 Тор	• Left
	O Middle	C Middle
		OK Cancel

Display the corresponding waveform and packet as below image:



<u>Waveform and Packet</u> <u>Synchronization</u> <u>Interface</u>

Introduction to Logic Analysis (cont'd)

5. Bus Analysis

Right Key to

Set Bus Property

The setup is correlated to the Bus which needs to be made up, for example: Bus, Protocol Analyzer.

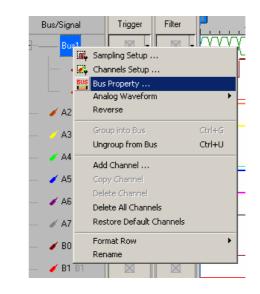
Open the dialog box:

Step 1 Click Tools on the Menu Bar, and then select Bus Property or select to set up Bus Property.

Bus Property Customize ... on Menu Bar Color Setting ... Bus Property . Refresh Protocol Analyzer Multi-stacked Logic Analyzer Settings Analog Waveform Bus Property 50% 🔖 Page 1 Ŧ Count Ŧ on Tool Bar Height 30 l÷ _\$[3 Tı 605

Step 2 Click the Right Key on the Bus/Signal column, and then select Bus Property.

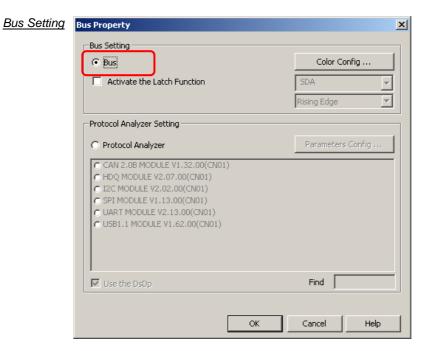
The signals must be grouped into Bus, or the Bus Property can not have effect.



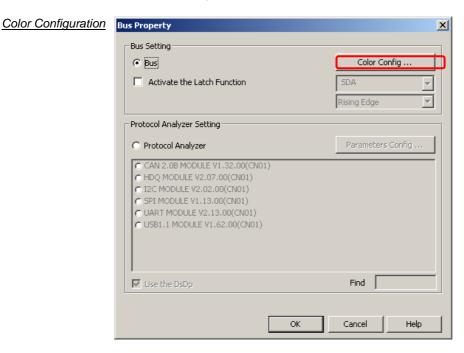
1. Bus Analysis The Bus Analysis function enables the system to analyze the Bus.

Basic Software Setup for the Bus

Step 1 Click Bus Property, the following dialog box will appear.



Step 2 Click Color Configuration to set Bus Data Color.



<u>Bus Data Color</u>	Bus Data Color	×
	Bus Name: Bus1	
	Data Condition: Data Min: Data Max:	
	Select Color:	
	Cancel Default Help	

Bus Name: Display the selected Bus name.

- **Data Condition**: Select the Data Condition to change the Bus data color. There are four options which are = , !=, In Range and Not In Range.
- Data Min: Enter the min. data that is required by users.
- Data Max:Enter the max. data that is required by users. The max. data can be used
only when the set is In Range or Not In Range.
- **Select Color**: Select the changed color according to the Bus condition set by users, the default is Green.
- **Step 3** Click Color Configuration to open the Bus Data Color dialog box, and set the "Data Condition = 0" and Select Color is Orange.

<u>Set the</u> <u>Color for Bus1</u>	Bus Data Color	×I
<u></u>	Bus Name: Bus1	
	Data Condition: Data Min: Data Max:	
	= v 0	
	Select Color:	
	OK Cancel Default Help	
Before the Bus Data Color Setting	Bus/Signal Trigger Filter -20 -15 -10 -5 0	5 10 15
Bus Data Color Setting		<u>x1 (0x2 (0x3 (0x0)</u>
After the	Bus/Signal Trigger Filter -20 -15 -10 -5 0	5 10 15
Bus Data Color Setting		x1 (0x2 (0x3) 0x0

Reserve the original state by the above steps.

Step 4 Activate the Latch Function

Activate the Latch Function: The default is not activated. When the Latch function is activated, the default channel is A0, and there are three conditions for selecting, Rising Edge, Falling Edge and Either Edge; the default is Rising Edge.

The Latch function is available for the 321000 and 322000 Modules, and it is not available for the 16064, 16128 and 32128 Modules.

Set the Latch function for one Bus. The setting of the Latch channel is A0; the analysis function adopts Rising Edge.

Activate the Latch Function

• Bus	Color Config	
 Activate the Latch Function 	A0 .	
	Rising Edge	
Protocol Analyzer Setting		
C Protocol Analyzer	Parameters Config	
CAN 2.08 MODULE V1.32.00(CN01)		
HDQ MODULE V2.07.00(CN01) I2C MODULE V2.02.00(CN01)		
SPI MODULE V1.13.00(CN01)		
 UART MODULE V2.13.00(CN01) USB1.1 MODULE V1.62.00(CN01) 		
✓ Use the DsDp	Find	
קטנט סנט י	1 113	

The picture of the waveform analysis:

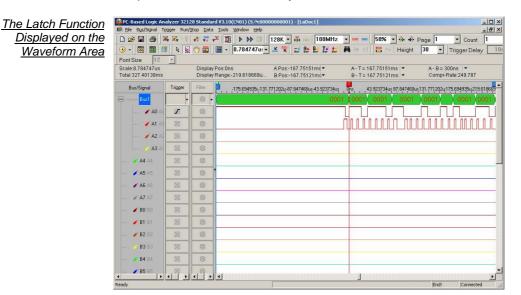


Illustration: The selected channel is A0; the analysis mode is Rising Edge; it indicates that the data of the A0 is read at the Rising Edge. See the T Bar in the above figure, the data of Bus1 is 0001.

2. I2C Analysis The I2C, which stands for Inter-Integrated Circuits, is a serial synchronous half-duplex communication protocol. The I2C was first proposed by Philips Semiconductor Netherlands. This I2C protocol consists of a very simple physical interface which has only two signal channels, SDA (Serial Data) and SCL (Serial Clock). Most I2C devices consist of an independently sealed I2C chip, and this I2C chip has direct connection to both SDA and SCL. The data transmission is a byte-base (8-bit base) for every segment. Since many oscilloscopes do not allow engineers to observe timing sequence information directly from the screens of oscilloscopes, this Logic Analyzer was created to help engineers resolve timing sequence issues during their circuit development.

I2C has a multi-control Bus as its physical and firmware interfaces. This protocol analyzer is basically a signal network that may connect to one or several control units. The intention of inventing this protocol was in the application of designing television sets, which allowed the central processing unit to quicken data communications with peripheral chips and devices. The I2C interface is initiated with a SDA triggered **High** and SCL triggered **Falling Edge**. Following the initiation, there will be a set of 7 bits (or 10 bits) address space. Beyond this point, there will be Read/Write, ACK (Acknowledgement), and STOP (or HALT/HLT). The signal information packet is transmitted in bytes. If there are two or more devices trying to access the I2C protocol, whichever device has SCL at logic high will gain access priority.

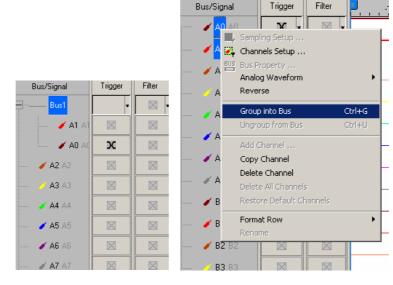
Furthermore, since I2C is a synchronous communication protocol and data transmission must be in bytes, a complete I2C signal packet must consist of **Start**, **Address**, **Read/Write**, **Data**, **ACK/NACK** and **Stop** segments. They are as following.

Start: This is the initiation of SCL and SDA (1 bit only).
Address: This identifies the device address (7 bits).
Read/Write: This is a data direction bit. 0 = Write, 1 = Read.
ACK/NACK: This is a confirmation bit following every data transmission segment.
Data: The actual signal data transmitted by byte.
Stop: This appears when SCL = High and SDA = Low (1bit only).

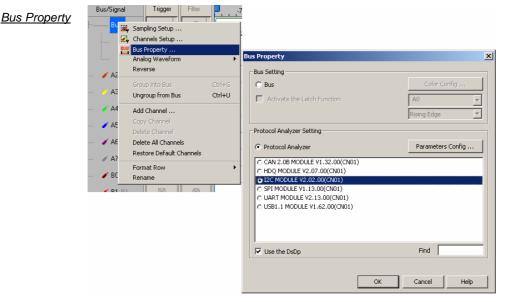
a) Software Basic Setup of Protocol Analyzer I2C

- *Step 1* Set up RAM Size, Frequency, Trigger Level and Trigger Position.
- Step 2 Set up the Falling Edge as the trigger condition on the signal which connects to the tested I2C data pin (SDA).
- Step 3 Group the analytic channels into Bus1.

Group into Bus



Step 4 Select Bus 1, then, press Right Key on the mouse to list the menu. Next, click Bus Property or click **Tools** and the select Bus Property or click to open Bus Property dialog box.



Step 5 For Protocol Analyzer Setting, select Protocol Analyzer. Then, choose I2C MODULE V2.02.00 (CN01). Next, click Parameters Configuration. The following image will appear.

Protocol Analyzer I2C Configuration dialog box

PROTOCOL ANALYZER 12C				×
Configuration Timing Packet Data Fi	ormat Register			
Pin Assignment	Data Mode			
	Item	Name	Data Length	
SDA: A0 💌	Slave Addr	Address	7	bit
SCL: A1 💌	🗖 Reg Ad	dr: Reg Addr	8	bit
	Data:	Data	8	bit
Protocol Analyzer Property				
Write Bit 💌 Low Level	🗖 Don't si	op analyzing when N	IACK appears	
ACK Low Level	🗖 Add the	Read/Write Bit for S	lave Address	
Protocol Analyzer Color				
Start Data	Slave Addr	Read W	rite Reg.	Addr
A-ACK A-NACK	D-ACK	D-NACK S	top	
			•••	
	ОК	Cancel	Default	Help

Step 6 Set the **I2C Configuration** dialog box.

Pin Assignment:

SDA Channel: It is the Data channel, and the default is A0.

SCL Channel: It is the Clock channel, and the default is A1.

Data Mode: Set the Data Length used by the Slave Addr and the Data.

Protocol Analyzer Property:

Set the Write Bit or Read Bit to Low Level.

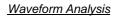
Set the ACK or NACK to Low Level.

Don't stop analyzing when NACK appears: When the option is selected, the data will be analyzed continuously when the NACK appears.

Add the Read/Write Bit for Slave Address: When the option is selected, the decoding will be displayed by way of the added Read/Write Bit for Slave Address.

Protocol Analyzer Color: Users can vary the colors of the decoded packet.

- Step 7 Press OK to exit the dialog box of Protocol Analyzer I2C.
- Step 8 Click Run to acquire I2C signal from the tested I2C circuit.
 - Click icon to view all data, and then select the waveform analysis tools to analyze the waveforms.



	jgger Run/: ∭, , ∰ç		Iools Window Help IIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
) - 🖾 📷 🧯			
ontSize 12	- -		📓 - 1.146492u: - 🥌 🕊 🔜 🔛 🔛 🔝 🏭 🍋 🖓 🔡 🐏 Height 30 🕑 Trigger Dela
cale:1.146492us			os:911.10108us A.Pos:>12.9054ms ▼ A - T = 12.9054ms ▼ A - B = 6us ▼
otal:26.2144ms		Display Ra	ande:882.438787 B Pos-12.8994ms R B T = 12.8994ms R Compr-Rate:No
Bus/Signal	Trigger	Filter	888 171246,893,903704,899,636163,905,368621,911,10108,916,833538,922,565997,928,296455,934,030914,939,7633737
Bust (I2C)			OX42 Write A-ACK Data : 0X4A
🥒 🧪 SDA			
SUL /	X	223	
— 🥖 A2 A2	\boxtimes		
🧭 🗛 🖂	\boxtimes		
🖌 🗛 🗛			
🖌 A5 A5		X	
🖌 🗛 👗	\boxtimes	×	
- / A7 A7			
🖌 BO BO			
🥖 B1 B1			
— 🥖 B2 B2		X	
<mark>/</mark> 83 83		8	
B4 B4			
		1 1	I P

b) Protocol Analyzer I2C Timing Analysis

Protocol Analyzer I2C Timing dialog box

PROTOCOL ANALYZER 12C	>
Configuration Timing Packet Data Format Register	
_ Waveform Image	
SDA → ←tsu:bat tsu:sto→ ←	
$t_{\text{HD:STA}} \rightarrow \qquad \leftarrow \qquad \rightarrow \qquad \leftarrow t_{\text{HD:DAT}} \qquad \qquad t_{\text{HD:STA}} \rightarrow \qquad \leftarrow \qquad \qquad$	
Time Format Settings I⊄ [Activate Time Settings]	
IF tHD:STA: 0.50 to: 50.00 us IF tSU:DAT: 0.20 to: 50.00 us	
IF tHD:DAT: 0.20 to: 50.00 us IF tSU:STO: 0.50 to: 50.00 us	
OK Cancel Default	Help

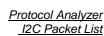
Waveform Image: Describe the position of the set time.

Time Format Settings: When the Time Settings is activated, the set time will become the condition of judging decoding. For example, when you want to decode START, you should judge whether the conditions of START are satisfied firstly, and then judge whether the set time of tHD: STA is coincident with the factual waveform. If the two conditions are satisfied, the START can be decoded. Other segments decoding of the packet is the same with that of the START.

c) Protocol Analyzer I2C Packet Analysis

Protocol Analyzer I2C	PROTOCOL ANALYZER 12	2C			×
<u>Packet dialog box</u>	Configuration Timing	Packet Data Format	Register		
	Item	Color	ltem	Color	
	Slave Add		A-NACK		
	🔽 Read		D-ACK		
	Vrite		D-NACK		
	🔽 Data		🔽 Describe		
	A-ACK		🔽 Reg Addr		
			ОК	Cancel Default	Help

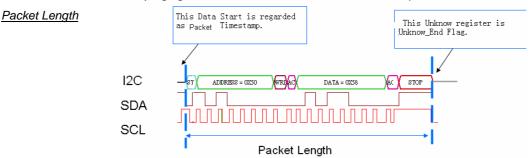
In the Packet dialog box, users can select the set item to be displayed and the color of item. It is a Bus Packet List view, which includes 4 formats, which I2C happens as follows.



BUS Pack														<u> </u>
Setting.	Refr	esh Expo	rt 9	iynch Pa	rameter									
Packet	t#	Name	TimeS	tamp	Address	Write	A-ACK	Data	D-ACK	Data	D-ACK	Data	D-ACK	
1	Bu	s1(I2C)	404	9	42	Write	A-ACK	4A	D-ACK	5B	D-ACK	6C	D-ACK	
	Data	D-ACK	Data	D-AC	K Data	D-ACK								
	7D	D-ACK	8E	D-AC	K 9F	D-ACK								
Packet	t#	Name	TimeS	tamp	Address	Write	A-ACK	Data	D-ACK	Data	D-ACK	Data	D-ACK	
2	Bu	s1(I2C)	848	2	12	Write	A-ACK	D5	D-ACK	E6	D-ACK	F7	D-ACK	
	Data	D-ACK	Data	D-AC	K Data	D-ACK								
	08	D-ACK	19	D-AC	K 2A	D-ACK								
	00	D-ACK	19	DAC	1 20	L D WOK								
Packet		Name	TimeS		Address	Read	A-ACK	Data	D-ACK	Data	D-ACK	Data	D-ACK	
Packet 3	t#			tamp					D-ACK D-ACK	Data 71	D-ACK D-ACK	Data 82	D-ACK D-ACK	
	t#	Name	TimeS	tamp	Address 06	Read	A-ACK							
	t # Bu	Name s1(I2C)	TimeS 1289	tamp 98	Address 06 K Data	Read Read	A-ACK A-ACK	60	D-ACK	71	D-ACK	82	D-ACK	
	t # Bu Data	Name s1(I2C) D-ACK	TimeS 1289 Data	tamp 98 D-AC	Address 06 K Data K B5	Read Read D-ACK D-ACK	A-ACK A-ACK Data C6 D-ACK	60 D-ACK	D-ACK Data	71 D-ACK D-ACK	D-ACK Data	82 D-ACK	D-ACK Data	
	t # Bu Data 93	Name s1(I2C) D-ACK D-ACK	TimeS 1289 Data A4	tamp 98 D-AC D-AC	Address 06 K Data K B5 ta D-ACk	Read Read D-ACK D-ACK	A-ACK A-ACK Data C6	60 D-ACK D-ACK	D-ACK Data D7	71 D-ACK D-ACK	D-ACK Data	82 D-ACK	D-ACK Data	
	Data 93 D-ACK D-ACK	Name s1(I2C) D-ACK D-ACK D-ACK	TimeS 1289 Data A4 D-ACK	tamp 98 D-AC D-AC Dat 18	Address 06 K Data K B5 ta D-ACk	Read Read D-ACK D-ACK	A-ACK A-ACK Data C6 D-ACK	60 D-ACK D-ACK Data	D-ACK Data D7 D-ACK	71 D-ACK D-ACK	D-ACK Data	82 D-ACK	D-ACK Data]
3	Data 93 D-ACK D-ACK	Name s1(I2C) D-ACK D-ACK Data 0A	TimeS 1289 Data A4 D-ACK D-ACK	tamp 98 D-AC D-AC Dat 18 tamp	Address 06 K Data K B5 ta D-ACK	Read Read D-ACK D-ACK	A-ACK A-ACK Data C6 D-ACK D-ACK	60 D-ACK D-ACK Data 3D	D-ACK Data D7 D-ACK D-ACK	71 D-ACK D-ACK	D-ACK Data E8	82 D-ACK D-ACK	D-ACK Data F9]
3 Packet	Data 93 D-ACK D-ACK	Name s1(I2C) D-ACK D-ACK DAta OA Name	TimeS 1289 Data A4 D-ACK D-ACK TimeS	tamp 98 D-AC D-AC Dat 18 tamp	Address 06 K Data K B5 ta D-ACK D-ACK Address 03	Read Read D-ACK D-ACK Data 2C Write	A-ACK A-ACK Data C6 D-ACK D-ACK A-ACK	60 D-ACK D-ACK Data 3D Data	D-ACK Data D7 D-ACK D-ACK D-ACK	71 D-ACK D-ACK	D-ACK Data E8 D-ACK	82 D-ACK D-ACK Data	D-ACK Data F9 D-ACK]

Packet1: It is commonly normal data, which includes 1 "Address" and 6 "Data". Packet2: It is commonly normal data, which includes 1 "Address" and 6 "Data". Packet3: It is commonly normal data, which includes 1 "Address" and 14 "Data". Packet4: It is commonly normal data, which includes 1 "Address" and 6 "Data". Packet4: It is commonly normal data, which includes 1 "Address" and 6 "Data".

When judging the start of I2C, it is the Packet TimeStamp.



Packet Length: From START (Start's TimeStamp) to STOP (Unknow_End Flag TimeStamp). Packet Idling Length: From Unknow_End Flag TimeStamp to Start's TimeStamp. This Unknow register is Unknow_End Flag.

d) Protocol Analyzer I2C Data Format Analysis

<u>Protocol Analyzer I2C</u> Data Format dialog box	PROTOCOL ANALYZER 12 Configuration Timing F		rmat Register			×
	Activate					
	Data:	O Binary	C Decimal	• Hexadecimal	O ASCII	
	Slave Addr.	C Binary	C Decimal	Hexadecimal	C ASCII	
	Reg Addr:	C Binary	C Decimal	Hexadecimal	O ASCII	
				OK Can	cel Default He	

Users can set the Data Format of the Data, Slave Addr and Reg Addr as their requirements. When selecting the option, Activate, the data formats are decided by the settings in the Protocol Analyzer; when not selecting the option, Activate, the data formats are decided by the settings in the main program.

VII - 112

3. UART Analysis The UART, which stands for Universal Asynchronous Receiver/Transmitter, is a serial asynchronous protocol. The UART is often time-integrated into PC communication devices, and it usually equips an EEPROM (Electronic Erasable/Programmable Read Only Memory) for error checking proposes with other chips. There are two concepts about UART which must be understood before performing any further tasks.

The UART protocol will first translate a parallel data into serial data, for the UART requiring only one wire to transmit signals. The transmission starts at a triggered Low position, and there are 7 or 8 bits of data following afterwards. To halt a transmission, it requires a signal or multiple bits of logic '1'. Odd number bit transmission requires odd parity error checking, and even number bit transmission requires even number error checking. Following the parity check is another data translation from serial data to parallel data. UART also generates an extra signal to indicate receiving and transmitting conditions.

Furthermore, since UART is an asynchronous communication protocol and data transmission may not be in bytes, a complete UART signal Packet must consist of **Start**, **Data**, **Parity**, **Stop**, **Baud Rate** and **TXD** segments. They are as following:

Start: When TXD is changing from HIGH to LOW voltage (1 bit).

Data: Users must decide the size of signal Packet segment from 4 to 8bits.

Parity: This performs three types of parity checks: odd parity, even parity, and none parity.

Stop: This occurs when TXD is at high voltage. This is adjustable; this is set to 1 or 2.

Baud Rate: This is the data transmission speed according to the initial condition of START.

TXD: This is the transmission direction. It is MSB → LSB by default.

a) Software Basic Setup of Protocol Analyzer UART

- Step 1 Set up RAM Size, Frequency, Trigger Level and Trigger Position as described in § Logic Analysis (The Setup of the Frequency should be higher, but not too far away from the Baud Rate of the test board).
- **Step 2** Set up Either Edge as the trigger condition on the signals which are connected to the Tx pin or the Rx pin of the tested UART board.
- **Step 3** Set up the Protocol Analyzer UART dialog box. The Protocol Analyzer UART dialog box is set as the steps of I2C.

Protocol Analyzer UART	PROTOCOL ANALYZER UART	×
Configuration dialog box	Configuration Packet Data Format Register	
	Pin Assignment	
	Channel: SDA	
	Protocol Analyzer Property	
	Parity Check: None Parity V Data 8 V Baud Rate: 9600 V Auto	
	Stop Bit: 1 Percentage 70% (Min:1bps, Max:10Mbps) Sample:	
	Transmission LSB->MSB T Data Reverse Decoding Direction:	
	Protocol Analyzer Color	
	Start Data	
	Parity Stop	
	OK Cancel Default Help	

Step 4 Set the UART Configuration dialog box

Pin Assignment:

UART only needs one channel to decode the signals, the default is A0.

Protocol Analyzer Property:

Parity Check: There are three options on the dropdown menu: None Parity, Odd Parity and Even Parity, and the default is None Parity.

Data Length: Set the Data Length in the range from 1 to 56.

Stop Bit: Select the Stop Bit from the three options: 1, 1.5 and 2, and it is stopped in the High Level.

Percentage Sample: Users can select the Percentage from the options (50%, 60%, 70%, 80% and 90%) on the dropdown menu, and the default is 70%.

Transmission Direction: Set the Transmission Direction to MSB->LSB or LSB->MSB.

Data Waveforms MSB- >LSB and LSB->MSB	Busi (VART Ai B	⊗ ⊗	DATA : 11110110 STOP	START	DATA : 11100001	STOP
		STOP	UNKNOW		DATA : 11000001	

Baud Rate: The dropdown menu has options as below: 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800 and 921600. Users can select the desired value from the menu. At the same time, The Auto can be selected to calculate the Baud Rate automatically (If the Auto is selected, the Baud Rate will be calculated and displayed on the Configuration dialog box automatically.)

Data Reverse Decoding: When the option is selected, the data will be decoded in reverse.

Vithout using the reverse data level to decode		× × ·	UNKNOW		
<u>Using the reverse data</u> <u>level to decode</u>	Busi (VART.	Image: state	UNKNOW	START	

Protocol Analyzer Color:

Users can vary the colors of the decoded packet.

Step 5 Press OK to exit the dialog box of Protocol Analyzer UART.

Step 6 Click Run to acquire the UART signal from the tested UART circuit.

🖞 Click 🕅 icon to view all data, and then select the waveform analysis tools to analyze the waveforms.

			# □ □ 128K ▼ ↓ 100MHz ▼ ∞ ∞ 50% ▼ ↓ → Page 1 ▼ Count Image: 11.6580721 ▼
Scale:11.658072us		Display P	os:812.398423us A Pos:-1.16453ms • A - T = 1.16453ms • A - B = 300ns •
Bus/Signal	Trigger	Filter	579 236985637 527345695 917704754 108064812 398423870 689783928 979142/987 269501 µ1 04556m 1,10365m
🖃 — Bust (UART		8	Data: 0XB6 (Even Parity) Start (Data: 0X6C
🖌 🗛 🗛	£ •	8 -	
🖌 A1 A1	\otimes	8	
🥖 A2 A2	\boxtimes	\otimes	
🏹 🗛 🖂		\otimes	
🖌 🗛 🗛		0	
🖌 A5 A5		0	
🖌 🗛 🕹		8	
/ A7 A7		0	
🖌 BO BO		8	
🧪 B1 B1		0	
🥖 B2 B2	\boxtimes	8	
B3 B3		0	

Waveform Analysis

Without using the reverse

b) Protocol Analyzer UART Packet Analysis

Protocol Analyzer UART	PROTOCOL ANALYZER UART	×
Packet dialog box	Configuration Packet Data Format Register	
	Item Color Item Color	
	🔽 Data 🔽 🛄 🛄	
	I Describe	
	Packet Idle(Time) 5ms (Min:10ns, Max:10s)	
	← Time → - Data: OXC2 UNKNOW Data: OX62 UNKNOW	
	OK Default He	elp

Data: List Data field captured by Bus in the packet display.

Parity: Display parity check in packet.

Describe: Error description to any field (format or data bit).

Packet Idle (Time): When the check box is selected, the default value is 5ms. Specifically, when the Packet Idle (Time) is activated, the packet will be divided again according to the Packet Idle (Time). If the Time Length between the previous packet and the next packet is more than 5ms, the two packets will still be divided, or the two packets will be merged into one packet.

It is a Bus Packet List view, which includes 4 formats, which UART happens below. PARITY clews whether users start PARITY or not.

<u>UART Packet List</u>		US Packet List Setting Refresh Export Synch Parameter								
	Packet #	Name Bus1(UART)	TimeStamp -21927	Data B6	Parity Even Parity		_			
	Packet #	Name	TimeStamp	Data	Parity	DESCRIBE				
	Packet #	Bus1(UART) Name	81164 TimeStamp	6C Data	Parity	rity Error,should Low	J			
	3 Packet #	Bus1(UART) Name	184247 TimeStamp	D9 Data	Even Parity Parity					
	4	Bus1(UART)	307617	EC	Even Parity		•			

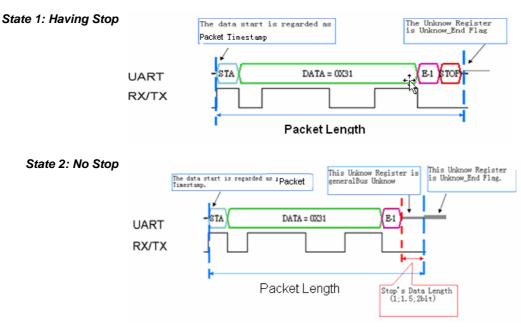
Packet1: It is commonly normal Data, which includes 1 "Data" and 1 "Parity"; its parity is Even Parity.

Packet2: It is the state of Parity Error; the DESCRIBE is "Parity Error, should Low ". Note: Because the Even Parity and the Odd are impossible to present to the same Bus, so we only take the Even Parity for an example here.

Packet3: It is commonly normal Data, which includes 1 "Data" and 1 "Parity"; its parity is Even Parity.

Packet4: It is commonly normal Data, which includes 1 "Data" and 1 "Parity"; its parity is Even Parity.

Packet Length: When judging to the start of UART, it is the packet TimeStamp.



If the STOP falls short of condition, it isn't noted down in UART.

Packet Length: From START (Start's TimeStamp) to STOP (Unknow_End Flag TimeStamp) Packet Idling Length: Unknow_ End Flag TimeStamp to START TimeStamp.

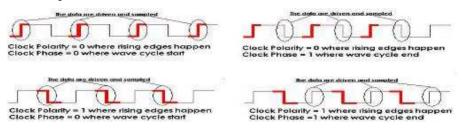
4. SPI Analysis SPI (Synchronous Peripheral Interface) is a parallel synchronous full duplex protocol with a Bus-like physical interface. This protocol was first developed by Motorola and was generally used for EEPROM, ADC, FRAM, and display device drivers which are equipped with low data transmission speed. The SPI data transmission is synchronous in both receiving and transmitting directions. Although Motorola initially did not define the clocking impulse, it is commonly seen that the clocking impulse is according to the master processor. In practice, there are two clocking impulses: CPOL (Clock Polarity) and CPHA (Clock Phase). The configuration of both CPOL and CPHA decides the sampling rate. When the SPI must transmit serial data, it initiates the highest bit.

Since SPI is a synchronous communication protocol and data transmission may not be in bytes, a complete SPI signal Packet must consist of SCK, MOSI, MISO and SS segments with CPHA and CPOL. They are as following.

SCK: Serial Clock Line (SCL).

MOSI: Master data output, Slave data input (MOSI stands for Master-Out-Slave-In).

- MISO: Master data input, Slave data output (MISO stands for Master-In-Slave-Out).
- **SS:** SS stands for Signal Selector of the master device which is to select signals for the Slave devices.
- **CPHA:** The clock phase (CPHA) control bit selects one of the two fundamentally different transfer formats.
- **CPOL:** The clock polarity is specified by the CPOL control bit, which selects an active high or active low clock.



a) Software Basic Setup of Protocol Analyzer SPI

- Step 1 Set up RAM Size, Frequency, Trigger Level and Trigger Position as described in Logic Analysis
- Step 2 Set up the Falling Edge on the signal of SS which connected to the Signal Selector (SS) pin of the SPI tested board.
- **Step 3** Set up the Protocol Analyzer SPI dialog box, the Protocol Analyzer SPI dialog box is set as the steps of I2C.

Protocol Analyzer SPI	PROTOCOL ANALYZER SPI	×
<u>Configuration dialog box</u>	Configuration Packet Data Format Register	
	Pin Assignment SS Pin Assignment SCLK: sclk DATA: data Protocol Analyzer Property SS Setting:	
	Mode: CPHA=0.CPDL=0 ▼ Transmission MSB->LSB ▼ Direction: MSB->LSB ▼ Data Length: 8 □ Fill*0" at the LSB when the bit count is not enough.	
	Protocol Analyzer Color Data	
	OK Cancel Default Help	<u> </u>

Step 4 Set the SPI Configuration dialog box

Pin Assignment:

SCLK: It is the Clock channel, and the default is A0.

DATA: It is the Data channel, and the default is A2.

Protocol Analyzer Property:

Mode:

There are six modes for selecting, which are CPHA=0,CPOL=0; CPHA=1,CPOL=1; CPHA=1, CPOL=0; CPHA=0, CPOL=1; Rising and Falling.

Transmission Direction:

Set the Transmission Direction to MSB->LSB or LSB->MSB.

Data Length:

Set the Data Length in the range from 1 to 56, and the default is 8.

Fill "0" at the LSB when the bit count is not enough: For example, the value of Data is "1001111", there is only 7 Bits. When the value of Data is set to 8 Bits, the displayed value should be 10011110.

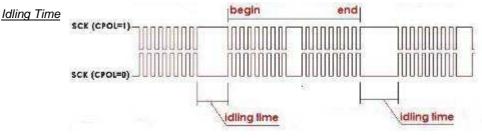
SS Pin Assignment:

SS Channel: Select the channel for the SS, the default is A1.

SS Setting: Set the Judgment Level of the SS Channel to Low or High.

Virtual SS: When the SS Channel is not activated, the Virtual SS will be activated. The Idling Time of the Virtual SS should be set as an auxiliary condition to decode.

Type the idling time of the SCLK signal on the tested SPI circuit.



Protocol Analyzer Color: Users can vary the colors of the decoded packet.

- Step 5 Click OK to exit the dialog box of Protocol Analyzer SPI.
- Step 6 Click Run to acquire the SPI signal from the tested SPI circuit.
 - Click icon to view all the data, and then select the waveform analysis tools to analyze the waveforms.

SPI Signal

🚯 - 🛛 🖬 👔		() 🗰	📷 - 376.32ns	× 🗶 🙀	B. IN 👯 🛤	14 ol 📴 🍨	Height 30 -	Trigger Del
FontSize 12	Ŧ							
Scale:376.32ns Fotal:204.8us			os:15.80544us ange:6.39744us	A Pos:-1.5us 💌 B Pos:1.5us 💌		= 1.5us 💌 = 1.5us 💌	A - B = 3us Compr-Rate:h	
Bus/Signal	Trigger	Filter	8,27904us 1	0.16064us 12.04224us 1	3.92384us 15.80544u	s 17.68704us 19.56	364us, 21.45024us, 23.3318	14us, 25.21344u
Bust (SPI)	- 123		0×12	(Data : 0×23)	Data : 0×34	Data : 0×	45) (Data : 0×8	i6)—(Dat
🖌 sok A								ILLU
🖌 ss A1		2						
🥖 data /								
🎸 🗛 🖓	183							
🖌 🗛 🔥	183	×						
🖌 A5 A5		\boxtimes						
🖌 AS AS								
# A7 A7		2						
🖌 BO BO		×						
🖌 81 B1								
🥖 B2 B2		\boxtimes						
🎸 B3 B3	153	\otimes						

b) Protocol Analyzer SPI Packet Analysis

Protocol Analyzer SPI Packet dialog box	PROTOCOL ANALYZER SPI	×
	Configuration Packet Data Format Register	
	Item Color	
	🔽 Data	
	ОК	Cancel Default Help

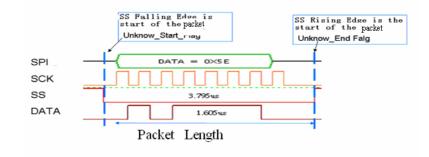
DATA: List Data field captured by Bus in the packet display.

Bus Packet List



Packet Length and Packet Idling Length

1. SS channel is activated



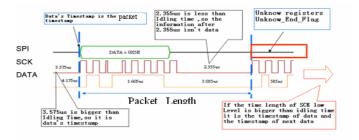


Packet Length: From Unknow_Start_Flag TimeStamp to Unknow_ End Flag TimeStamp

Packet Idling Length: From Unknow_End Flag TimeStamp to Unknow_Start_Flag TimeStamp

2. SS channel is not activated.

Virtual SS is activated 1: Data needs 8-bit; the Idling Time is set as 3us.

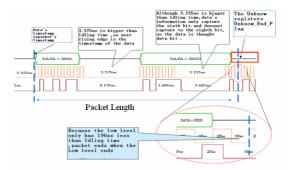




Packet Length: From Unknow_Start_Flag TimeStamp to Unknow_ End Flag TimeStamp

Packet Idling Length: From Unknow_End Flag TimeStamp to Unknow_Start_Flag TimeStamp

Virtual SS is activated 2: Data needs 8-bit; the Idling Time is set as 3us. Don't care data bit is not activated.



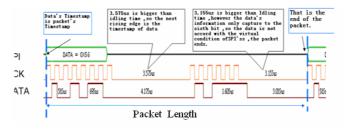


Packet Length: From Unknow_Start_Flag TimeStamp to Unknow_End Flag TimeStamp Packet Idling Length: From Unknow_End Flag TimeStamp to Unknow_Start_Flag

Logic Analyzer

TimeStamp

Virtual SS is activated 3: Data needs 8-bit; the Idling Time is set as 3us. Don't care data bit is activated.

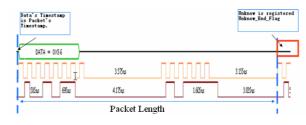




Packet Length: From Packet's TimeStamp Data to next Packet's TimeStamp Data

Packet Idling Length : It is 0.

The End dot is Unknown.

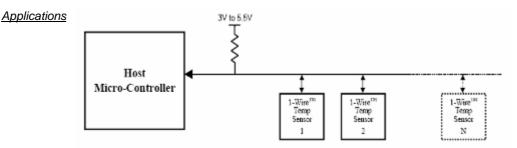




Packet Length: From Packet's TimeStamp Data to next Packet's TimeStamp Data

Packet Idling Length: It is 0.

- **5. 1-WIRE Analysis** To increase the Protocol Analyzer feature in order to analyze the Protocol Analyzer 1-WIRE transmission protocol data. Using LA analysis function, the required serial data can be converted and presented in the form of Bus. Therefore, the software needs to add a dialog box so as to set up a Protocol Analyzer 1-WIRE dialog box.
 - **Features** 1-WIRE is a non-synchronic half-duplex serial transmission, which requires only one OWIO to transmit data. The typical 1-WIRE transmission structure is illustrated in following Figure. During the 1-WIRE transmission, the OWIO can be used to transmit data and supply power to all devices connected to the 1-WIRE. OWIO will link to a 4.7K Ohm Pull-High electric resistance which is linked to the power supply (3V-5.5V). The transmission speed for 1-WIRE can be divided into two types, standard and high speed. Every 1-WIRE has a unique 64-bit code for the device to recognize. Therefore, the maximum number of link devices is 1.8; almost unlimited.



1-WIRE is commonly applied to the EEPROM and to certain sensor interfaces.

<u>Protocol Analyzer Signal</u> Specifications	Parameter	Value
	Name of Protocol Analyzer	1-WIRE
	Required No. of Channels	1
	Signal Frequency	Not fixed, around 10K
	Appropriate Sampling Rate	1MHz
	Same Data Time Per Bit	⊡Yes ∎No
	Name of Syn. Signals	OWIO
	Data Verification Point	30 us after the falling edge signals

Protocol Analyzer IO Description

iption	Name	Function
	OWIO	The only I/O transmits Reset signals and data.

Protocol Analyzer				-		
<u>Electrical</u> Specifications	Parameter	Min.	Тур.	Max.	Unit	Note
Specifications	High-count Voltage	2.8		5.2	V	Every IC varies according to the Pull-High voltage.
	Low-count Voltage		0		V	

Protocol Analyzer 1-WIRE Format Description

Two speed types of 1-WIRE: Standard: 1MHz (1us) High: 5MHz (0.2us)

Four types of 1-WIRE Signals:

1. Reset:

Every communications period starts with Reset signal. Master will send a Reset Pulse so that all the Slave devices on the 1-WIRE Protocol Analyzer enter into recognition status. When one or many Slaves receive Reset Pulse, a Presence Pulse signal will be sent back from Slave, indicating receipt of the signal.

- 2. Write 0: Send a "0" bit to Slave (Write 1 time slot).
- 3. Write 1: Send a "1" bit to Slave (Write 1 time slot).
- 4. Read Data:

"Read data sequences" resembles "Write time slot." However, when Master releases BUS and reads data from Slave devices, Master creates samples from BUS status. In this way, Master can read any 0 or 1 bit from Slave devices.

Four signal types are described respectively in the following:

1. Reset:

(1) When Master starts communicating with Slave, Master first sends a lowcount Reset Pulse (TX) of t_{RSTL} (Standard speed: 480us; High Speed: 48us) for a period of time.

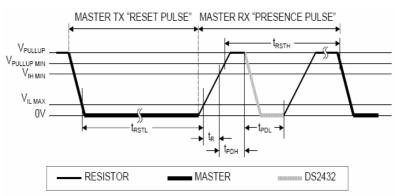


Fig. Master TX Reset Pulse and Master RX Presence Pulse

(2) Then, Master releases Protocol Analyzer and enters the RX mode.

Through high- pull resistor, 1-WIRE Protocol Analyzer is pulled back to the high status.

- (3) Then, Master detects a rising edge from the Data Line when every slave will wait for a period of time (t_{PDH}) (standard speed: 15-60us; high speed: 2-6us) and send back a Presence Pulse to Master (t_{PDL})(standard speed:60-240us; high speed: 8-24us).
- (4) Finally, the 1-WIRE Protocol Analyzer will be pulled back to the high status through the resistor.
- (5) Meanwhile, Master can detect any online Slave.
- (6) From Fig4-95, the low count Reset Pulse and Presence Pulse signals can be clearly seen.

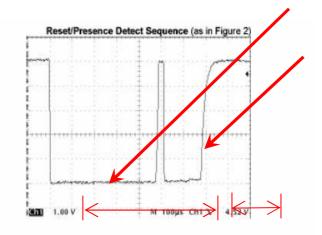


Fig Reset/Presence Detect Sequence

2. Write Data:

- (1) To initialize Write Data, Master will convert the Data Line from the high logic to the low.
- (2) There are two types of Write time slot: Write 1 time slot and Write 0 time slot.
- (3) During a write cycle, all Write time slots must have duration of at least 60us and a recovery period of 1us.
- (4) When the I/O line goes down, Slave devices create samples from 15-60 us.

A. Write 0: If the sampling is low, 0 is generated as in Fig4-98:

Write-zero Time Slot

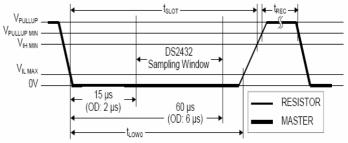


Fig - Write-zero Time Slot

B. Write 1: If the sampling is high, 1 is generated (Note: Read 1 is of a similar waveform pattern) as :

Write-one Time Slot

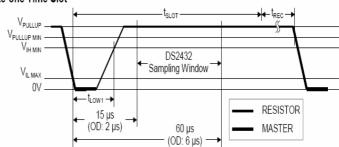


Fig - Wrote-one Time Slot

3. Read Data:

- (1) When Slave reads data, Master will generate a Read time slot.
- (2) To initialize Read Data, Master has to convert Data line from the high logic to the low.
- (3) Data line must be kept as low as 1us.
- (4) The Output Data of Slave must be 14us at most.
- (5) To read from 15us where Read slot starts, Master must stop driving I/O.

Read-data Time Slot

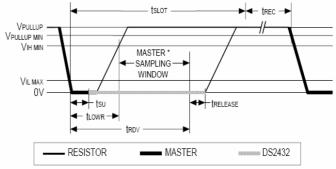


Fig - Read-data Time Slot

- (6) When Read Time Slot ends, I/O Pin will be pulled back to the high count through the external resistor.
- During a write cycle, all Write time slots must have duration of at least 60us and a recovery period of 1us.

4. Typical 1-WIRE Conversation model can be summarized as below:

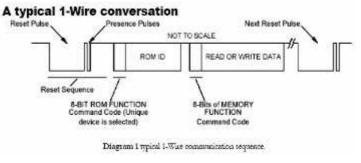


Fig4 - A Typical 1-WIRE Conversion

- Master keeps Protocol Analyzer at low signal (standard speed: 480us; high speed: 48us) as the Reset Pulse.
- (2) Then, Master releases Protocol Analyzer and locates a Presence Pulse responded by any online Slave.
- (3) The above two points are Reset Pulse and Presence Pulse, which can be put together as a Reset Sequence.
- (4) If Presence Pulse is detected, the slave location will enable Master to access Slave using the Write 0 or Write 1 Sequence.

5. 1-WIRE Serial Number:

- (1) Every 1-WIRE Slave has a unique laser memory.
- (2) The serial number is 64bits.
- (3) The serial numbers are 8bytes in total, located in three individual, which are illustrated as below:

MSB		64-bit 'Registration' ROM number		
8-bit	CRC	48-bit Se	rial Number 8-bit Fa	unily Code
MSB	LSB	MSB	LSB MSB	LSB

- (4) Starting from LSB, the first byte is for family code, which is used to identify product categories.
- (5) Next, the 48bits is the only address for storage.
- (6) The last byte, MSB is used to store CRC.

a) Software Basic Setup of Protocol Analyzer 1-WIRE

Protocol Analyzer 1-WIRE Configuration dialog box

Configuration	R 1-WIRE et Data Format Register	
Pin Assignment —		Protocol Analyzer Color
0WI0:	A0 💌	Reset Pulse ····
- Protocol Analyzer I		Presence Pulse
Connect Speed:	Standard(1 us)	Data
Transmission Direction:	MSB->LSB	Sampling Position
Data Length:	8 bit	30 us
	(Min:1bit,Max:32bit)	(Min:1,Max:120)
	 ОК	Cancel Default Help

Set the 1-WIRE Configuration dialog box.

Pin Assignment:

1-WIRE only needs one channel to decode the signals, and the default is A0.

Connect Speed:

The Connect Speed can be set to Standard(1 us) or High(0.2 us).

Transmission Direction:

The Transmission Direction can be set to MSB->LSB or LSB->MSB.

MSB->LSB: From High Level to Low Level.

LSB->MSB: From Low Level to High Level.

Data Length:

The Data Length can be set in the range from 1 to 32-bit, and the default is 8-bit.

Sampling Position:

The Sampling Position can be set in the range from 1 to 120 us , and the default is 30 us .

Protocol Analyzer Color:

Users can vary the colors of the decoded packet.

User Interface Instructions

Set up the Protocol Analyzer 1-WIRE dialog box which is set as the steps of I2C.

Protocol Analyzer 1-WIRE	PROTOCOL ANALYZER 1-WIRE	×
Configuration dialog box	Configuration Packet Data Format Register	
	Pin Assignment OW10: A0 Protocol Analyzer Color Reset Pulse Protocol Analyzer Property	
	Connect Speed: Standard(1 us) 💌 Data	
	Transmission MSB->LSB Direction: Sampling Position Jata Length: 8 (Min:1bit,Max:32bit) (Min:1,Max:120)	
	OK Cancel Default Help	

Step 1 Select Channel

1-WIRE has only one OWIO. Select the channel that it is to link the OWIO.

<u>Protocol Analyzer</u>	PROTOCOL ANALYZER 1-WIRE	×
<u>1-WIRE Channel Setup</u>	Configuration Packet Date Format Register	
	Pin Assignment OWID: A0 Protocol Analyzer Color Reset Pulse Protocol Analyzer Property Connect Speed: Standard(1 us)	
	Transmission MSB->LSB Sampling Position Data Length: 8 bit (Min:1bit,Max:32bit) (Min:1,Max:120)	
	OK Cancel Default Help	

Step 2 Set the Connect Speed

1-WIRE has two modes: Standard(1 us) and High(0.2 us). The speed setup according to the specifications of the object to be tested and the default mode is standard.

Protocol Analyzer 1-	PROTOCOL ANALYZER 1-WIRE	×
WIRE Connect Speed	Configuration Packet Data Format Register	
<u>Setup</u>	Pin Assignment	
	OWIO: A0 Reset Pulse	
	Presence Pulse	
	Connect Speed: Standard(1 us)	
	Transmission MSB->LSB Sampling Position	
	Data Length: 8 bit 30 us 300 us 300 bit	
	(Min:1bit,Max:32bit) (Min:1,Max:120)	
	OK Cancel Default Help	

Step 3 Set the Transmission Direction

Set the Transmission Direction as either MSB -> LSB or LSB -> MSB.

Protocol Analyzer 1-		1
WIRE Transmission	PROTOCOL ANALYZER 1-WIRE	×
Direction Setup	Configuration Packet Data Format Register	
	Pin Assignment	
	OWIO: A0 Reset Pulse	
	Protocol Analyzer Property	
	Connect Speed: Standard(1 us)	
	Transmission MSB->LSB Sampling Position	
	Data Longer: 8 bit 30 us	
	(Min:1bit,Max:32bit) (Min:1,Max:120)	
	OK Cancel Default Help	

Step 4 Set the Sampling Position

Users can slightly adjust the sampling position of 1-WIRE. This feature is applicable when the signal cannot be decoded. The default value is 30us.

Protocol Analyzer 1-	PROTOCOL ANALYZER 1-WIRE	×
WIRE Sampling	Configuration Packet Data Format Register	
Position Setup	Pin Assignment Protocol Analyzer Color	
	OWID: A0 Reset Pulse	
	Presence Pulse	1
	Connect Speed: Standard(1 us) 🔽 Data	
	Transmission MSB->LSB Sampling Position	
	Data Length: 8 bi 30 us	_)
	(Min:1bit,Max:32bit) (Min:1,Max:120)	
	OK Cancel Default	Help

Step 5 Set the Data Length

This function decides how many bits of data can be combined as one set of figures. The default is 8 bits, and the maximum is 32bits.

Protocol Analyzer 1-	PROTOCOL ANALYZER 1-WIRE	×
WIRE Data Length Setup		
	Configuration Packet Data Format Register	_1
	Pin Assignment Protocol Analyzer Color	
	OWID: A0 Reset Pulse	
	Protocol Analyzer Property	
	Connect Speed: Standard(1 us) 🔽 Data	
	Transmission MSB->LSB Sampling Position	
	Data Length: 8 bit 30 us	
	(Min:1bit,Max:32bit) (Min:1,Max:120)	
		<u> </u>
	OK Cancel Default Help	

b) Protocol Analyzer 1-WIRE Packet Analysis

Protocol Analyzer 1-WIRE Packet dialog box

PROTOCOL AN	ALYZER 1-WIRE		x
Configuration	Packet Data Fo	rmat Register	
	Item	Color	
	🔽 Data		
	🔽 Describe	· · · · · · · · · · · · · · · · · · ·	
		OK Cancel Default Help	

That is the new View; the below View includes several formats that 1-WIRE can happen; it describes Data number and their positions.

US Packet L				4																
Setting	Refresh Export	Synch Parame	eter	<u> </u>																
Packet #	Name	TimeStamp									Data	1								
1	Bus1(1-WIRE)	4032363	33	96	30	96	03	90	02	48	Β7	FF	FF	FF	FF	FF	FF	04	00	
Packet #	Name	TimeStamp									Data	1								
2	Bus1(1-WIRE)	8065053	33	96	30	96	07	90	00	48	F7	FF	FF	FF	FF	FF	FF	04	00	
Packet #	Name	TimeStamp									Data	1								
3	Bus1(1-WIRE)	12096936	33	96	30	96	03	90	02	48	8F	FF	FF	FF	FF	FF	FF	04	00	
Packet #	Name	TimeStamp									Data	1								
4	Bus1(1-WIRE)	16129232	33	96	30	96	03	90	02	48	8F	FF	FF	FF	FF	FF	FF	04	00	
Packet #	Name	TimeStamp									Data	1								
5	Bus1(1-WIRE)	20161527	33	96	30	96	07	90	01	48	2F	FF	FF	FF	FF	FF	FF	04	00	

Packet 1: It is commonly normal Data, which includes 1 "Data".

Packet 2: It is commonly normal Data, which includes 1 "Data".

Packet 3: It is commonly normal Data, which includes 1 "Data".

Packet 4: It is commonly normal Data, which includes 1 "Data".

Packet 5: It is commonly normal Data, which includes 1 "Data".

Packet and Idling Length: Packet's TimeStamp is reset.

Protocol Analyzer 1-WIRE Packet List

6. HDQ Analysis

Increase the Protocol Analyzer feature to analyze the Protocol Analyzer HDQ transmission protocol data. Using LA analysis function, the required serial data can be converted and presented in the form of Protocol Analyzer. Therefore, the software needs to add a dialog box so as to set up a Protocol Analyzer HDQ dialog box.

HDQ Introduction

1. Introduction Features

Protocol Analyzer HDQ is a non-synchronic half-duplex serial transmission, which requires only one HDQ and uses a quasi-PWM (Pulse Width Modulation) to verify the serial data.

Applications

HDQ is commonly applied to the display interface for battery management.

2. Protocol Analyzer Signal Specifications

Parameter	Value
Name of Protocol Analyzer	HDQ
Required No. of Channels	1
Signal Frequency	Not fixed, around 12MHz, 13MHz and 19,2MHz
Appropriate Sampling Rate	100MHz
Same Data Time Per Bit	⊡Yes ∎No
Name of Syn. Signals	HDQ
Data Verification Point	Low signals⊡190us converts to High signals⊡40us

3. Protocol Analyzer IO Description

Name	Function
HDQ	The sole I/O transmits Host and BQ-HDQ status and data.

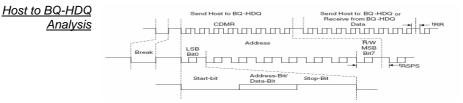
4. Protocol Analyzer Electrical Specifications

Parameter	Min.	Туре	Max.	Unit	Note
Logic Input High	2.5			v	
Logic Input Low			0.5	v	

Pulse from Low to High

Protocol Analyzer HDQ Format Description

The format changes according to the pulse width, so the display must refer to the defined pulse width. Protocol Analyzer HDQ is made up of 16 bits signals. Firstly, after the period of status signals, a device will be installed for the 7 bits address through the Host so that 1-bit signals can be read or written. After a response time of high signals, data will be exported in 8 bits format with the data and location content from LSB to MSB. The following is the Host to BQ-HDQ analysis.



Protocol Analyzer Format

Break This is the initial bit for the Protocol Analyzer HDQ: after Low signal lasting a period of t (B), it is then converted to a High signal lasting a period of t(BR). The length of Low signal is no less than 190us whereas the High signal is no less than 40us.



- Address The Address comprises 7 bits. The initial Low signal lasts a period of t(HW1) and if the write-0 status continues through the end of the t(HW0) period, the signal will convert to High and last throughout the period of t(CYCH), as shown by the dotted line in the following figure. Conversely, if it is the write-1 status, after t(HW1) period of time, the signal will convert to High and last throughout the period of t(CYCH), which is of 1 bit and no less than 190 us. The t(HW1) range is from 0.5us to 17us and no more than 50us. The t(HW0) range is from 86us to 100us and no more than 145us.
- Read/Write Read/Write is 1 bit. 0 and 1 are displayed in the same way as the above description.

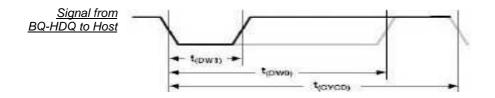
T (RSPS)

The High signal lasts a period of 190us-320us. The following 8-bit data is Send Host to BQ-HDQ or Receive from BQ-HDQ Data.

Data

Made up by 8 bits, and it is Send Host to BQ-HDQ or Receive from BQ-HDQ Data. It operates in the same way as in 2.2 and the data is from LSB to MSB.

BQ-HDQ To Host If the data transmission is read by BQ-HDQ To Host, the initial Low signal lasts a period of t(DW1) and if the write-0 status continues through to the end of the t(DW1) period, the signal will convert to high and last throughout the period of t(CYCD), as shown by the dotted line in the following figure. Conversely, if it is the write-1 status, after t(DW1) period of time, the signal will rise and last throughout the period of t(CYCD), which is of 1 bit and ranges from 190us to 260us. The t(DW1) ranges from 32us to 50us and no more than 50us. The t(DW0) ranges from 80us to 145us.



a) Software Basic Setup of Protocol Analyzer HDQ

```
Protocol Analyzer HDQ
Configuration dialog
box
```

- Channel:	A0 💌						
Time Settings(u	15)						
Break:	190	to	1000000	Recovery:	40	to	1000000
Host 1:	0	to	70	Device 1:	0	to	70
Host 0:	80	to	180	Device 0:	80	to	180
Host Bit:	190	to	260	Device Bit:	190	to	260
🔽 Response:	190	to	320	Remark:1000	0000 is infinite		
Protocol Analyz	er Color						
Break	Recove	у	Address	Read	Write		Data

Set the HDQ Configuration dialog box.

Pin Assignment:

HDQ has only one signal channel, therefore it only specifies the name of the channel and marks the selected channel.

Protocol Analyzer Name: Display the name of the selected Bus.

Channel: Preset as A0.

Timing Settings(us):

Set the time for Break, Address, Read, Write, Data and Recovery.

Protocol Analyzer Color: Users can vary the colors of the decoded packet.

PC-Based Logic Analyzer 32128 Standard V3.10(CN01) (S/N:) - [LaDoc1] Open the LA operation - 🗆 × ll Ele Bus/Signal Tugger Run/Sop Data Iools Window Help □ 28 日 48 第 第 第 2 〒 48 取 ト ト □ 2K ▼ 01 前に 100MHz ▼ nv nv 150% ▼ 4+ → Page 1 interface ✓ Count 🕒 - 🞯 🗃 🚳 🖡 🗟 🗸 🛱 🞯 - 10ns 🕑 🗉 🧸 💒 😫 🔛 💭 🛤 🕪 SI 🖾 😁 Height 30 🔍 Trigger Delay Font Size 12 -Display Pos:Ons Display Range:-250ns ~ 2... A - T = 150ns ▼ B - T = 150ns ▼ Scale:10ns Total:20.48us A Pos:-150ns -B Pos:150ns -A - B = 300ns Compr-Rate:No Trigger Filter 200ns 250ns Bus/Signal Uns 50ns 100ns 150ns -200ns -150ns -100ns -50ns 🖌 🗛 🖌 . 🖌 A1 A 🎸 A2 A2 \boxtimes \boxtimes A3 A3 \boxtimes \mathbb{X} / A4 A4 \boxtimes \mathbb{X} / A5 A5 \boxtimes 🖌 A6 A8 \boxtimes \mathbb{X} / A7 A7 \boxtimes \boxtimes \mathbb{X} 🥖 BO BC \boxtimes 🥖 82 82 <mark>/</mark> B3 B3 \boxtimes \boxtimes 🖌 B4 B4 DEMO PC-Based Logic Analyzer 32128 Standard ¥3.10(CN01) (S/N:00000000001) - [LaDoc2] - 🗆 × Sample the HDQ He Bus/Sic -8× signal or open the sampled waveform. Font Size 12 Scale:3.687069ms Total:167.594055ms 12 -A - T = 83.878645ms ▼ B - T = 83.878495ms ▼ Display Pos-86.665us A Pos-83.878645ms▼ Display Range-83.883685... B Pos-83.878495ms▼ A - B = 150ns + Compr-Rate:255.728 Filter 86 665us 18.348681m36.784027m55.219373m73.654719m92.090065m Trigger 22011n Bus/Signal 🖌 🗛 🖉 1. 0 🖌 A1 A \otimes 🥖 A2 🖂 \boxtimes 0 A3 A3 0 \boxtimes 🥜 🗛 🖂 \otimes \otimes \otimes 🖌 A5 A5 \otimes 0 🖌 A6 A6 \otimes / A7 A7 \boxtimes \otimes 🥖 BO BC 🥖 B1 B1 \boxtimes \otimes 🥖 82 B. \boxtimes 0 83 B \boxtimes 0 🥜 B4 B4 Arrange the signal _ & × channels into Bus. 🚯 🗸 📾 🎟 🎯 💊 🗟 🖑 🛗 📾 🗸 3.687069m 🗸 🦧 🐙 🤯 👯 🔛 🕻 🛃 14 + 31 📖 👓 Height 30 💽 Trigger Delay Font Size 12 Scale 3.687069ms Total:167.594055ms Display Pos:-86.665us Display Range:-83.883685... A Pos:-83.878645ms -B Pos:-83.878495ms -A - T = 83.878645ms B - T = 83.878495ms A - B = 150ns -Compr-Rate:255.728
 Bur/Signal
 Trigger
 Filter
 Pilter
 Pi Analog Waveform Reverse Group into Bus Add Channel ... Copy Channel Delete Channel Delete All Channels Restore Default Channels Format Row Rename / B2 B3 83 \boxtimes 0 152 🧪 B4 84

Operating Instructions

Connected

End

DC-Based Logic Analyzer 32128 Standard V3.10(CN01) (S/N:00000000001) - [LaDoc2] - 0 × Select Bus Property -8× Trigger Run/Stop 🗅 😂 🗟 🚑 🥰 🖓 🐢 👯 📲 🛐 🕨 🕪 💷 128K 🗙 👬 🗰 200MHz 💌 🚥 👘 50% 💌 🎋 🏤 Page 1 Count 🚯 🗸 國 🎟 🎁 🔖 🖏 🖑 🛗 📓 🗸 3.687069m 🛛 🥌 🖞 🚅 😫 🔛 🔛 👪 🕼 🕬 🖬 👘 🖓 🔛 Trigger Delay Font Size 12 Scale:3.687069ms Total:167.594055ms Display Pos:-86.665us Display Range:-83.883685... A - T = 83.878645ms ▼ B - T = 83.878495ms ▼ A Pos:-83.878645ms -B Pos:-83.878495ms -A-B=150ns -Compr-Rate:255.728 Bus/Signal Trigger Filter 73.828049n-55.392703n-36.957357n-18.522011m=86.565us 18.348681m36.784027m55.219373m73.654719m92.090065n 0×1 0×1 0×1 0×1 Bu . Sampling Setup . 0×1 🔣 Channels Setur Bus Property / A1 Reverse / A2 A3 Ungroup from Bus Ctrl+U 🥖 A4 Add Channel ... 🖌 A5 / A6 Delete All Channels Restore Default Channels / A7 Format Row 🥖 B0 Rename 🥖 B1 🥖 B2 B2 \boxtimes \otimes 🗲 B3 83 + Conr PE-Based Logic Analyzer 32128 St. . | **|** | ×| Select the decoding _ @ × function of the
 D 28 20 30
 20 + 27
 20 + 20
 128 × 40 + 10
 200MHz < 400</td>
 50% × 40 + 20 age 1 × Count

 30 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 20 + 20
 Protocol Analyzer 12 -HDQ and select OK Font Size A - B = 150ns + Scale:3.687069ms Total:167.594055ms Display Pos:-86.665us Display Range:-83.883685... A Pos:-83.878645ms -B Pos:-83.878495ms -A - T = 83.878645ms ▼ B - T = 83.878495ms ▼ to confirm. Bus Property × 19373m73.654719m92.090065m Bus/Signal Trigger -Bus Settin Bust (HDQ Ø . 0X1 C Bus 0 / A0 5 C Activate the Latch Eurotion 🖌 A1 A1 \otimes 🖌 A2 A2 \otimes \otimes Protocol Analyzer Setting A3 A3 \otimes Protocol Apalyzer Parameters Config . 🖌 🗛 🦂 \boxtimes \otimes CAN 2.08 MODULE V1.32.00(CN01 COM 208 MODULE V1.32.00(CN0)
 HDQ MODULE V2.07.00(CN01)
 C 12C MODULE V2.02.00(CN01)
 C SPI MODULE V1.13.00(CN01)
 C UART MODULE V2.13.00(CN01)
 C USB1.1 MODULE V1.62.00(CN01) 🥖 A5 A5 \boxtimes 0 🖌 AG AB \otimes 🖌 A7 A7 \boxtimes 0 🥖 BO BO 8 🥖 B1 81 Find | Use the DsDp 🥖 B2 82 \otimes **83 83** OK Cancel Help 1 Endl
 PC-Based Logic Analyzer 32128 Standard V3.10(CN01) (S/N:00000000001) - [HDQ.als]

 <u>File</u> Bys/Signal Trigger Run/Stop Data Tools Window Help

 Complete the _ 8 × Protocol Analyzer D 😂 🖬 🚔 🐺 😳 🕂 🕂 📅 🐌 D 🔲 128K ▼ 👫 👳 1MHz 💿 🚥 🚥 50% ▼ 🞋 🔶 Page 1 ▼ Count 1 HDQ decoding.
 Image: Comparison of the state of
 Image: Source of the second Bus/Signal . 13.52164ms, 13.539929ms, 13.558018ms, 13.576207ms, 13.594396ms, 13.612586ms, 13.630775ms, 13.648964ms, 13.667153ms, 13.6853 Trigger Bust (HDQ) . 0 / A0 х 🖌 A1 A1 \otimes / A2 A2 \otimes A3 A3 0 0 🖌 🗛 📈 8 / A5 AF \otimes 🖌 A6 A6 🖌 A7 A7 \boxtimes \otimes 🖌 80 80 \mathbb{X} 0 🥖 B1 B \otimes 🥖 B2 82 \otimes B3 83 60 🖌 B4 84 0

End! DEMO

🧪 85 85

 \boxtimes

8

b) Protocol Analyzer HDQ Packet Analysis

Protocol Analyzer
HDQ Packet
dialog box

ROTOCOL ANALYZER Configuration Packet	Data Format Register			×
Item	Color	Item	Color	
🔽 Break		Vrite		
Recovery		🔽 Describe		
Address				
🔽 Data				
🔽 Read				
		OK	Cancel Default	Help

Item: Select the content which needs to display in the Packet List, which includes Break, Recovery, Address, Data, Read, Write and Describe.

Color: Set color for items which needs to display in the packet list.

7. CAN 2.0B Analysis

CAN 2.0B Introduction

Add Protocol Analyzer function to analyze CAN 2.0B transport protocols data. CAN 2.0B serial transmission, there are two signal channels, CANH and CANL, which match with baud ratio judge serial data. If you want to change serial data into Bus format, you need to analyze this function with LA. a dialog box needs to be added; you should set up a Protocol Analyzer CAN 2.0B dialog box.

1. Brief Introduction

Features

CAN 2.0B (Controller Area Network) is an Asynchronous Transmission Protocol. It costs low, sky-high use rate, far data transmission distance (10KM), very high data transmission bit (1M bit/s), sending information without appointed devices according to message frame, dependable error disposal and detection error rule, message automatism renewal after damage, and node can exit Bus function on the serious error .

Applications

CAN 2.0B is used for automotive electronics correlation systems connection.

2. Protocol Analyzer Signal Specifications

Parameter	Value
Name of Protocol Analyzer	CAN 2.0B
Required No. of Channels	1
Signal Frequency	Not fixed, around 12MHz, 13MHz and 19,2MHz
Appropriate Sampling Rate	100MHz
Same Data Time Per Bit	⊡Yes ∎No
Name of Syn. Signals	CAN 2.0B
Data Verification Point	Low signals⊡190us converts to High signals⊡40us

3.	Protocol	Analyz	er IO
		Descri	ption

Name	Function
CANL	The main signal source of transmission data
CANH	Signal is opposite to the signal source of transmission data

4. Protocol Analyzer Electrical Specifications

Parameter	Min.	Туре	Max.	Unit	Note
Logic Input High	2.5			v	
Logic Input Low			0.5	v	

CAN 2.0B Frame Specification CAN 2.0B can separate into frames as follows: Data Frame, Remote Transmit Request Frame, Error Frame, Overload Frame. Because CAN2.0B is transmitted by the format of different signals, the signal can separate into CANL and CANH, and the signal direction of CANH is opposite to that of CANL. Next we analyze CAN 2.0B signal with the standard of CANL.

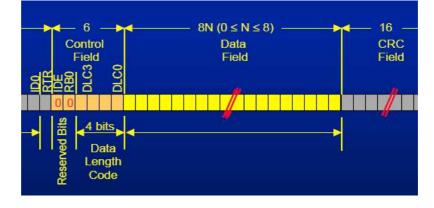
Basic Data Frame Data frame can be divided into Basic CAN and Peli CAN, Data Frame of Basic CAN transmission. As follows, message data can be separated into Start of Frame (SOB), Arbitration Field, Control Field, Data Field, CRC Field, Ack Field, End of Frame.

Arbitration	Control	Data	CRC	Ack	End of
Field	Field	Field	Field	Field	Frame
		ubanan / ananan	an a		

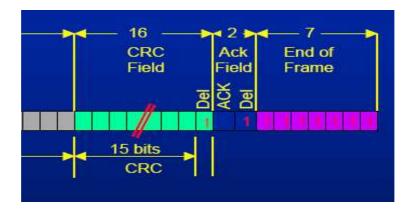
Start of Frame Every Start of Frame must be 0, which means asking far data to come back.

Arbitration Field Identifier is 11bits; its function is the sequence when transmitting signal, numerical value is lower, the priority is higher, and the array is from ID-10 to ID-0, and the numerical value is not all from ID-10 to ID-4, finally RTR(Remote Transmit Request) is the judgment bit of transmission or Remote Transmit Request. When RTR=0, it denotes that the data goes out; when RTR=1, it means asking far data to come back.

Control Field Control Field consists of 6 bytes, including Data Length Code and two Reserved Bits as Peli frame for future expansion. The transmission reserved bit must be 0. Receiver receives all bits combining 1 with 0. As the below figure, IDE and RB0 of Control Field are Reserved Bits which must be 0 and the latter 4bits are only 0-8 which denotes the data behind will transmit several bytes data.



Data Field The Data Field consists of the data to be transferred within a Data Frame. It can contain from 0 to 8 bytes, and each contains 8 bits which are transferred MSB first.

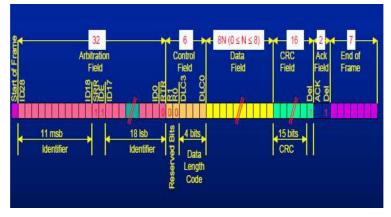


CRC Field 16bits CRC, the last is a delimiter, and the default is 1.

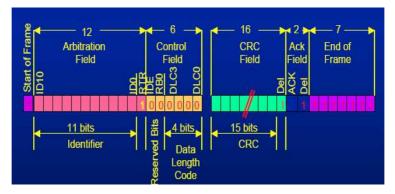
Ack Field That is the return signal of Receiver, which has 2 bits, and the final is a delimiter whose default is 1. If receiving success, Ack will send back 0, then the transmitter knows the Receiver has received the data.

End of Frame 1111111 denotes end.

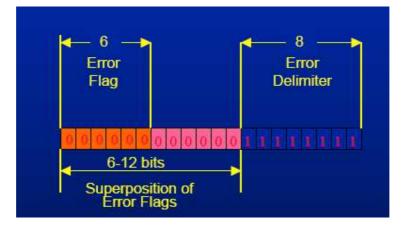
Peli Data Frame In the Peli Data frame, Data Frame as follows, the frame of message is separated into Start of Frame (SOB), Arbitration Field, Control Field, Data Field, CRC Field, Ack Field, End of Frame. However, the parts of Arbitration Field have much more than 18bits and the SRR and IDE are 1.



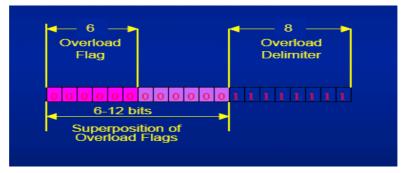
Remote Transmit When RTR=1, it denotes Remote Transmit Request Frame, at this time, DLC3...DLC0 are *Request Frame* the Data bytes of return data. And the frame doesn't have Data Field.



Error Frame The Active Error Flag consists of six consecutive Data Field 'dominant'bits. Dominant bits violate the law of bit stuffing. All bits can produce Error Frame after recognizing bit stuffing wrong, the Error Frame called Error. Corresponding Error Flag Field includes sequence bits from 6 to 12 (which produces by 1 or more nodes). Error Frame ends in Error Delimiter field. After Error Flag sends out Bus actively to get the right state, and the interrupted node tries its best to send abeyant message Error Delimiter. Error Delimiter consists of eight 'recessive' bits and allows Bus node to restart Bus transmission after Error happens.



Overload Frame There are two kinds of Overload conditions, which both lead to the transmission of an Overload Flag. The internal conditions of a node which require a delay of the next Data Frame start during the first bit of Intermission. Overload Flag can send six '0', which may damage Intermission format so that it makes the other nodes know node sending Overload Flag at this time. When Overload Flag is sent out, Overload Delimiter can send eight '1', others send seven '1'after finishing either.



Interframe Space Interframe Space is divided into Intermission and Bus Idle. Intermission is three '1'. It is impossible to send any message during this time, except Overload Frame. The Bus is recognized to be free; the period of BUS IDLE may be of arbitrary length. And any station having something to transmit can access the Bus. When a node is at the state of 'error passive', the node will send eight '0' after INTERMISSION and other node have the chance to retransmit themselves information.

a) Software Basic Setup of Protocol Analyzer CAN 2.0B

Protocol Analyzer
CAN2.0B Configuration
dialog box

- Start Packet Format			
- Start Packet Format			
Start Packet Format			
 111Bit Start 0 Bit Start 			
a Reverse Decoding r End Packet happens, just begin to yze en CAN Data for expansion,combine c ID and ID Del is displayd in the CRC Field			
Error ACK			
Overload NACK			
r Jy Bic			

Set the CAN 2.0B Configuration dialog box

Pin Assignment:

Protocol Analyzer CAN 2.0B only needs one channel to decoding signals, the default channel is A0.

Start Packet Format: The Start Position can be divided into two formats, 111 Bit Start (the Start Position is that three bits are High.) and 0 Bit Start (the Start Position is that one bit is Low).

Protocol Analyzer Property:

Percentage Sample: The Percentage Sample should be entered in the position of the Baud Rate which is selected from the range between 25% and 75%, and the default of the Baud Rate is 60%. The resolution can be adjusted to 1%.

Baud Rate: The Baud Rate can be set to Integer or selected from the pull-down menu (10000, 20000, 40000, 50000, 80000, 125000, 200000, 250000, 400000, 500000, 660000, 800000 and 1000000) manually, and the default is 125000. If the Auto is selected, the Baud Rate can be calculated by the main program automatically and displayed on the CAN 2.0B dialog box.

Data Reverse Decoding: If it is selected, the data can be decoded in reverse.

After End Packet happens, just begin to analyze: If it is selected, the signal will be decoded when the End Packet appears.

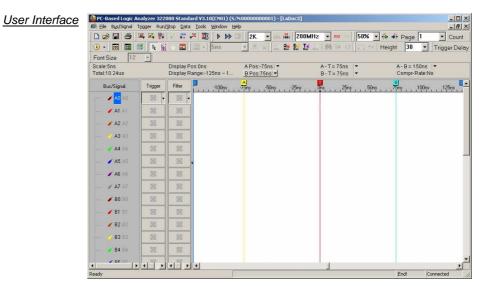
When CAN Data for expansion, combine Basic ID and ID: If the option is selected, the Basic ID and ID will be combined.

The Del is displayed in CRC Field: If it is selected, the Del will be displayed in the CRC Field.

Protocol Analyzer Color:

The protocol analyzer colors can be varied by users.

Operating Instructions Turn on the user interface of the Logic Analyzer.

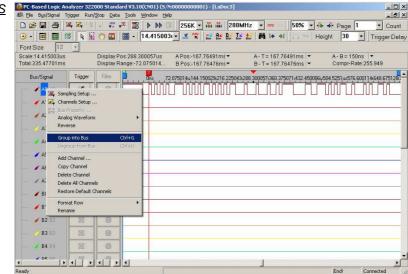


Sample the CAN 2.0B signal or open the sampled waveform.

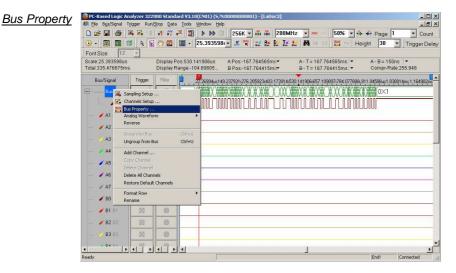
CAN 2.0B Waveform

0 6 8 3	96, 25, 200	γ ¹ γ ¹ γ ^Π	🛙 🛐 🕨 🕪 🔲 256K 🔹 👬 👬 200MHz 💌 🚾 50% 💌 🎋 👬 Page 1 💌 Cour
🔊 - 🛛 📾 🕅	💷 🖌 🚺	() 🗰 🛛	📓 - 🛛 25.3935981 - 🧩 👯 😹 😹 😹 👪 🛤 14 🖘 🗐 🚦 🐄 Height 🛛 💽 Trigger De
ont Size 12	*		
cale:25.393598us otal:335.476675m			s:530.141906us APos-167.764565ms▼ A-T=167.764565ms▼ A-B=150ns ▼ nge:104.69805BPos:167.764415ms▼ B-T=167.764415ms▼ Compr-Rate:255.948
Bus/Signal	Trigger	Filter	22 26994us149.237931.276.205923.403.173914.530_141906.657.109897.784.077888.911.04588us1.038014ms1.164982m
🖌 🗛 😽	1.		
🖌 A1 A1		0	
🥖 A2 A2		0	
🧭 🗚 🖂	\boxtimes	\otimes	
🧭 🗛 🛝		\otimes	
🖌 🖌 A5		◎ .	
🖌 🗚 🔥	8	0	
— 🖉 A7 A7		0	
💉 BO BO		\otimes	
🥖 B1 B1	X	0	
🧪 B2 B2	\otimes	0	
— 🥑 B3 B3		0	
2 84 84		8	

Group the signal channels into Bus.

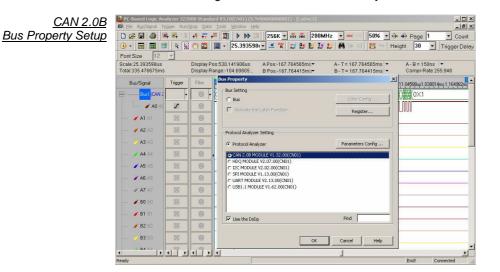


Group into BUS



Select the Bus Property to set up the Bus Property dialog box .

Select the decoding function of the Protocol Analyzer CAN 2.0B and select OK to confirm.



Double click the CAN 2.0B MODULE V1.32.00 (CN01) to set the Protocol Analyzer CAN 2.0B dialog box.

Protocol Analyzer CAN 2.0B Setup	PROTOCOL ANALYZER CAN 2.0B	×
<u></u>	Configuration Packet Data Format Register Pin Assignment Protocol Analyzer Name: Bus1 Cite and Cite	
	Channel: A0 C 0 Bit Start	
	Percentage Sample: 60% Data Reverse Decoding After End Packet happens, just begin to analyze	
	Baud Rate: 125000 T Auto (Min:1bps,Max:10Mbps) Auto (Min:1bps,Max:10Mbps) T he Del is displayd in the CRC Field	
	Protocol Analyzer Color Start Control CRC Error ACK End ID Data Overload NACK	
	OK Cancel Default Help	

5. Bus Analysis (cont'd)

D 🔗 🖬 🎒 🕯	1. 2. 10	4	Iools Window Help 3
<u></u>			📓 - 13.5506221
Font Size 12	-		
Scale:13.550622us Total:335.476675ms			os:424.30709us A Pos:-167.764565mis▼ A - T = 167.764565mis▼ A - B = 150ns ▼ ange:85.541552u B Pos:-167.764415mis▼ B - T = 167.764415mis▼ Compr.Rate:255.948
Bus/Signal	Trigger	Filter	153 29466u221.047767i288 800875i366 553982i424 30709u492 0601986559 813305i627.566413,695.31952u763.07
Bust (CAN 2			D 0×156AB (0×89) 0×78) 0×67 0×56 0×45 0×34 0×23 0×
📕 🥖 🗛 🔪	Z	8	
🖌 A1 A1		0	
🖌 A2 A2		\otimes	
🧹 🗛 🖂		0	
🖌 🗛 🗛		0	
🖌 A5 A5		8	
🖌 A6 A6		\otimes	
/ A7 A7		0	
🖌 BO BD	183	8	
🖌 B1 B1		\otimes	
🧪 B2 B2		\otimes	
🥜 B3 B3		\otimes	
J NO KO	•	~	

Protocol Analyzer CAN 2.0B Packet Analysis

Protocol Analyzer CAN 2.0B Packet dialog box PROTOCOL ANALYZER CAN 2.0B × Configuration Packet Data Format Register Color Item 🗹 ID Control 🔽 Data CRC CRC 🔽 ACK NACK 🔽 Describe ΟK Cancel Default Help

Packet color can be varied by users.

Click **OK** in the Protocol Analyzer CAN 2.0B dialog box to complete the CAN 2.0B Setting.

5. Bus Analysis (cont'd)

CAN 2.0B Packet List -OX
 Efe
 Bys/Signal
 Togger
 Run/Stop
 Qeta
 Locis
 Window
 Belp
 Locis
 Xin
 Xin _ 3 × Displayed with the Waveform Font Size 12 -Scale:13.550622us Total:335.476675ms Display Pos:424.30709us A Pos:-167.764565ms Display Range:85.541552u... B Pos:-167.764415mi≠ A - T = 167.764565ms ▼ B - T = 167.764415ms ▼ A - B = 150ns -Compr-Rate:255.948 1 Bus/Signal Trigger Filter 153.29466u221.047767.288.800875.356.553982v424.30709u492.060198.559.813305.627.566413v695.31952u763.0726287 Bust (CAN 2 ŀ . / A0 A0 1 \otimes ΠΠ Π 🌌 🗛 🖌 \otimes 0 🥖 A2 A2 \otimes 8 \otimes A3 A3 \otimes 🖌 🗛 🖂 🖌 A5 A5 • Setting... Refresh Export... Synch Parameter... ST EX RE OV ER et # eStamp Bus1(CAN 2.0B) -16.025us 2A9 SRR IDE 156AB RTR RB1 RB0 8 89 78 67 56 45 34 23 12 1 CRC ACK DESCRIBE D495 ACK Unsatisfied Format • End! Connected

The Packet displays with the waveform as below:

6. Compression

The Compression function enables the system to Compress the received signal and has more data stored in per channel.

Software Basic Setup of Compression

- Step 1 Set up RAM Size, Frequency, Trigger Level and Trigger Position.
- Step 2 Set up the trigger edge on the signal or the Bus to be triggered.
- Step 3 Click III icon, or click the Compression function from the Sampling Setup dialog box then click Apply and OK to run.

<u>Compression</u> <u>Mode</u>		
	Group into Bus Ungroup from Bus Expand Collapse	Clock Source Asynchronous Clock for Internal Clock Frequency: 100KHz
	Format Row Rename	Synchronous Clock C External Clock C External Clock C Rising Edge Frequency: 100KHz C Falling Edge (Min:0.001Hz, Max:100MHz) Note: The external clock voltage level is the same as the port A trigger level
		Sampling RAM Size RAM Size: 2K Data Compression Mode Signal Filter Signal Filter Setup Signal Filter Setup
		Apply OK Cancel Restore Defaults Help

Step 4 Click Run, and then activate the signal from the tested circuit to acquire the result on the waveform display area. Fig 4-138 shows the result before and after compression has been applied.

									-1-1
PC-Based Logic #				A110000111-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	1) - [LaDoc4]	_			_ 0
	00, 21, 1 90				M4 1441 200MH	lz √ nnr	50% - 🚸 -	Page 1	Count
🛞 - 🕅 📖	13 R 1	en 📅 📋	115.3433	161 🕶 🮿 🙀		🛃 🙀 14 🔊	1.1	-	Trigger Del
Font Size 12									
Ocale:115:34336us Total:655:36us	8		is:-327.675us inge:-327.675us	A Pos:-322 B Pos:-322		A - T = 322.63 B - T = 322.48		A B = 150n: Compr-Rate	
Bus/Signal	Trigger	Filter	-2.634542ms	2.057825ms-1.48	1109ms-904,3918us -	3. 75 us 249.04	18us 825.7586us 1.4	102475mş 1.9791	(92ms 2.555909ms
🖌 🖌 🛶	7 -								
— 🖌 🖌 A1									
🥖 A2 A2									
🧭 🗚 🖓	\boxtimes					— —			
🖌 🗛 🗛									
🖌 A5 A5									
🖌 🗚 A6 A6		\boxtimes							
🖉 A7 A7		\boxtimes							
🖌 BO BO									
🖋 B1 B1									
🧪 B2 B2		\boxtimes							
🧭 B3 B3	\boxtimes								
— 🧭 В4 В4									
		• • •	•						
Ready			[End!	Connected

6. Compression (cont'd)

ompression 🛛 🗅 😹 🖨 🍯	ų 🔣 🖏	+ *** +	🛙 🛐 🕨 🕨 🔲 128K 🕶 👬 🛱 200MHz 💌 🚥 🛛 50% 👻 👫 🎝 Page 1	- Cou
🕓 - 🕅 📰 📋		🖑 🗰 🗍	🏽 - 🚺 115.343361 🗾 💒 💘 🕵 🕵 🕵 🗱 👹 🕪 🖗 🖙 Height 🛛 🕤 丁 Tri	gger D
Font Size 12	*			
Scale:115.34336us Total:167.704465ms		Display Po Display Ra	s:Ons A Pos:-83.878435ms ▼ A - T = 83.878435ms ▼ A - B = 150ns ▼ nge:-2.883584m B Pos:-83.878285ms ▼ B - T = 83.878285ms ▼ Compr.Rate:255.89	97
Bus/Signal	Trigger	Filter	🖣 , .2,306867ms-1,73015ms-1,153434ms576,7168µs , Uns , .576,7168µs 1,153434ms 1,73015ms,2,306867ms2	.883584r
🖌 🖌 🛶		⊗ -		
🖌 A1 A1		0		
🖌 A2 A2	\boxtimes	\otimes		
🔶 🗛 🖂	\boxtimes	\otimes		
🖌 🗛 🗛		0		
🖌 A5 A5	183	. ⊗		
🖌 A6 A6	\boxtimes	\otimes		
🖉 A7 A7	\boxtimes	\otimes		
🖌 BO BO		\otimes		
🧪 B1 B1		\otimes		
🧪 B2 B2	\boxtimes	0		
🌙 B3 B3	\boxtimes	\otimes		

Using 128K memory depth, before Compression has been applied, the total of the data was 655.36us; after the Compression had been applied, the total of the data was 167.704465ms, therefore, the compression rate is 255.897.

Click icon to view all data, and then select the waveform analysis tools to analyze the waveforms.

Step 5 Click the compression icon again or click off the compression function to stop compression.

d Compression cannot be applied with the signal filter function at the same time.

7. Signal Filter and Filter Delay

The functions of the Signal Filter and Filter Delay allow the system to keep the required waveform, and filter out the waveforms that aren't required.

Basic Setup of Signal Filter and Filter Delay

Software Basic Setup of Signal Filter and Filter Delay

- *Step 1* Set up RAM Size, Frequency, Trigger Level and Trigger Position.
- **Step 2** Set up the trigger edge on the signal or the Bus to be triggered.
- Step 3 Click relicon, or click the Signal Filter Setup button on the Sampling Setup dialog box or select the item form the pull-down menu of the Bus/Signal and then the Signal Filter Setup dialog box will appear.

ed Logic Analyzer 32128 Standard ¥3.10(CN01) (5/N:) - [LaDoc1]

×

Signal Filter Setup

			100, s 120, s	iampling Setup Thannels Setup)	Stop Data () () () mpling Setup	D 3 ►	••			i∰i 100) A⊯ B≷ Ti	
 Samplin Channe Signal F Group it 	Is Setup ilter Setup nto Bus p from Bus s	op <u>D</u> ata Ctrl+G Ctrl+U		iroup into Bus Angroup from E xpand Glapse format Row tename	Bus [Synchronous C External C Risi C Fall	Clock rcy: 100kb Clock Clock ng Edge ng Edge e external cl 2K	Frequ ock voltage	ency: level is l ession f	the same a	IHz, Max: 100 as the port A Signal I Signal I	trigger le
Rename						Apply	ОК	Can	cel	Restor	e Defaults	He
Filter Conc PortA PortB PortC PortD	Trigger Condition Filter Condition Trigger Condition Filter Condition Trigger Condition Filter Condition Trigger Condition Filter Condition	7		4 × × × × × ×	3							
Select	ate Filter Delay Filter Delay Mode cording to Filter Conditi posite of Filter Conditic		Select Delay Start Ed C End Edg C Period+	lge Je		Delay Tir Sns (Min:Sns) (Max:327	•					
	Bar İtyle Original 💌 Width Sns	[
	OK		Cancel	R	estore	Defaults	F	lelp				

7. Signal Filter and Filter Delay (cont'd)

Set the high level as Filter Condition on the signal A1.

Step 4 Signal Filter Setup

- 1. Setup the Filter Condition as a on the signal to be analyzed.
- 2. Click OK, then click Run to activate the signal from the tested circuit to the Logic Analyzer.
- 3. The system will display only the waveforms of the signals which are qualified by the Filter Condition.

Without/With	Bus/Signal	Trigger	Filter	
Signal Filter Setup	🖌 🖌 🖌	z	\boxtimes	311. 795us <u>15. 88</u> 30. 525us 20. 4us
	🖌 🗚 A1			<u>309. 055us</u>
	/ A2 A2			655.36us
	A3 A3			655.36us
	🖌 A4 A4		\square	655.36us
	🖌 A5 A5	×	\boxtimes	655. 36us
	🖌 🖌 A6	×	\boxtimes	655.36us
	🖋 A7 A7			655. 36us

Bus/Signal	Trigger	Filter	2 −20 −15 −10 −5 7 5 10 15 20
AO AO	Z	\square	
🖌 🗚 A1	-	-	N 388. 33us
/ A2 A2			₩
🧹 A3 A3			<u>w</u> 388. 33us
🖌 A4 A4	\boxtimes	\boxtimes	<mark>и</mark> 388. 33us
🖌 A5 A5			388. 33us
🖌 🖌 A6			^w 388. 33us
🖋 AT AT			388. 33us

The first picture shows the result without any signal filter setup. The second picture shows the result which has set the high level on the Filter Condition of the signal A1. Only the waveform with the high status of A1 is displayed.

Step 5 Filter Delay Setup

- 1. Click on the Activate Filter Delay.
- 2. Click on the According to Filter Condition or the Opposite of Filter Condition to select the waveforms to be kept.
- 3. Click on the Start Edge, End Edge or Period + Delay to set the Start Point of Filter Delay.
- 4. Type the value of the Delay Time into the column of the Delay Time.
- 5. Click OK, then click Run to activate the signal from the tested circuit to the Logic Analyzer.
- 6. The result will be displayed in the waveform display area.

7. Signal Filter and Filter Delay (cont'd)

Step 6 Stop Signal Filter/ Filter Delay

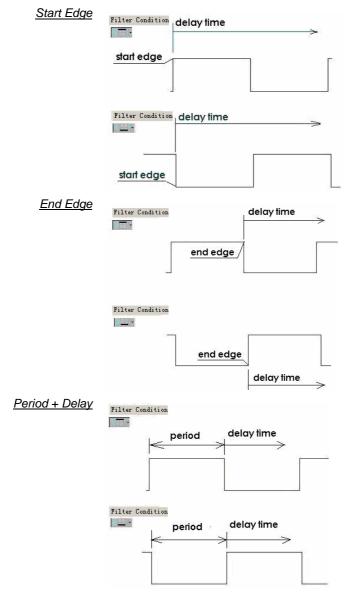
Click **Stop**, then click **Signal Filter Setup** and select **Cancel** from the Signal Filter Setup dialog box to stop the Signal Filter or the Filter Delay Setup.

- Click Stop to check the conditions of the Signal Filter or the Filter Delay Setup, if there aren't any results.
- Click icon to view all the data, and then select the waveform analysis tools to analyze the waveforms.

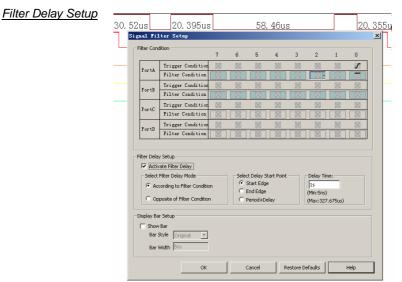
Filter Delay Setup

Filter Delay Setup		
Select Filter Delay Mode	Select Delay Start Point Start Edge C End Edge	Delay Time: 5ns (Min:5ns)
O Opposite of Filter Condition	C Period+Delay	(Max:327.675us)

Definitions of the **Start Edge** and the **End Edge** and the **Period + Delay** are listed as follows :



7. Signal Filter and Filter Delay (cont'd)



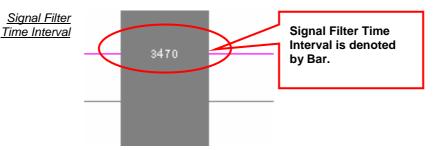
The delay time of signal A0 is 1 us, which is the condition of the Filter Delay Setup.

Step 7 Signal Filter Time Interval

1. Click Show Bar to know the length of the tested and deleted signal as shown below:

<u>Display Bar Setup</u>	Display Bar Setup Show Bar Bar Style Original Bar Width
	OK Cancel Restore Defaults Help

- 2. The bar has two styles, which are Original and Bar; the default is Original style, which denotes the bar function cannot be used. When selecting Bar style, the bar function can be activated.
- 3. Bar Width, when Bar style is selected, the bar width can be set by users.
- The minimum bar width is 1; the maximum bar width is 65535. If the value exceeds the range, or the font is not according to the requirement, a tip window will appear.



- 🖞 The Signal Filter Time Interval is limited under the following situations:
 - A: The Filter Delay and Display Bar of Signal Filter are not available under the compression mode.
 - B: The Filter Delay and Display Bar of Signal Filter are not available under the double mode.
 - C: The final two data are NULL.
 - D: Logic Analyzer supports the Signal Filter Time Interval function on condition that the time interval between signal filter must be more than two clocks.

- -

8. Noise Filter

The Noise Filter function enables the system to filter the waveform that doesn't meet users' requirements.

Basic Software Setup of Noise Filter

Step 1 Click Data on the Menu Bar, then select 2 Noise Filter to activate the noise filter function as the figure below.

Noise Filter

iiiei	<u>Data Lools Mindow H</u> elp	
	🔁 Select an Analytic Range	Noise Filter X
	noise Filter	
	🔯 Bus Width Filter	Nation Filham
	🗶 Data Contrast	Noise Filter: None
	👪 Find Data Value Ctrl+F	OK Cancel
	📮 Find Pulse Width	

Step 2 Transmit the tested signal to the Logic Analyzer as the figure below.

<u>Tested Signal</u>	Bus/Signal	Trigger	Filter		<u>.</u>	<u>,</u>	<u>1</u> 1 1 1 1	<mark>1</mark>	-10	-5	4	, 	5	10
	🖌 🗛 🗛	-		1 1 1	1 1	1 1	1 1 1	1 1 1 1 1	1 1 1 1	1 1 2	1 1	1 1 1 1 1	1 1 1 1	1 1 1 1 1 1
	🖌 A1 A1			2 2	2	2	2 2	2 2	2 2	2 1	2 2	2 2	2 2	2 2 2
	/ A2 A2	\boxtimes	\boxtimes	4	4		4	4	4	3	4	4	4	4
	🧭 A3 A3				8			8	7			8		8

Step 3 Filter waveforms that are not bigger than 5 clocks.

<u>The condition of Noise</u> <u>Filter is 5clock.</u>	Noise Filter		×
	Noise Filter:	None None I clock 2 clock 3 clock 4 clock 5 clock 6 clock 7 clock 8 clock 9 clock 10 clock	
	Noise Filt		×
		Jesteisen	ncel

8. Noise Filter (cont'd)

Step 4 After filtering, the waveforms that are not bigger than 5 clocks are deleted.

<u>Waveforms</u>	Bus/Signal	Trigger	Filter	<mark>.</mark>	 	10 -5	 	5 10	15 20	
after Filtering	🖌 🗛 🖌	-	- 12				20	48		
	🖌 A1 A1						20	48		
	🥖 A2 A2	×					20	48		
	🧭 🗚 🖓			8	8	7	8	8	8	

Step 5 Reserve the original waveform: open the Noise Filter window, and then select None, the waveform will be restored.

Restore Waveform	Noise Filter		×
	Noise Filter:	None	•
		None 1 clock	
	OK	2 clock 3 clock	
	127	4 clock	
		5 clock 6 clock	
		7 clock 8 clock	
		9 clock	
		10 clock	

9. Data Contrast

In order to make users analyze the Data and contrast the difference of Data easily, there are adding the function of Data Contrast. The function of Data Contrast is used to compare the difference of two signal files of the same type. One is the Basic File and the other is the Contrast File. It can line out the different waveform segments of the basic file in the contrast file. Meanwhile, it can count the number of the difference.

The second secon

Basic Software Setup of Data Contrast

Step 1	Click Data on the Menu Bar, the	en select A to open the Data Contrast Set	lings dialog box
<u>Data Contrast</u> Interface		Data Contrast Settings Image: Active Data Contrast Contrast Files	×
		Basic File 2.alc Contrast File 1.alc	
		Contrast Beginning Point Error Tolerance	
		A0[A0] FAIL 8 A1[A1] PASS 8 A2[A2] PASS 8 A3[A3] PASS 8 A4[A4] PASS 8 A5[A5] PASS 8	irror Stat.
	Data <u>I</u> ools <u>W</u> indow <u>H</u> elp Select an Analytic Range Woise Filter Bus Width Filter Data Contrast	✓ Display files the contrast differences ✓ Display files horizontal ✓ Do contrast automatically when being run	n Assignment
	Find Data Value Ctrl+F	Apply Close	Help

Activate Data Contrast: Click the checkbox to activate the function of Data Contrast.

Basic File: It is the standard contrast file.

Contrast File: It is used to compare with the Basic File.

Contrast Beginning Point: It can set the beginning point of the contrast at Trigger Bar or Beginning of Data.

Error Tolerance: It is the allowable time error when setting data contrast.

Contrast Result: It displays the same contrasted result and the different contrasted result with PASS and FAIL respectively.

Error Stat. : It displays the number of discrepant parts.

Pin Assignment: Users can select the contrastive channel.

Perform Contrast: It can activate the Contrast at once.

Display files horizontal: The waveform window of the two contrast files are displayed in horizontal. Users can select it as their requirements and the default is non-activated.

Roll the contrast waveforms synchronization: The two contrast files roll synchronously. Users can select it as their requirements and the default is non-activated.

Display files the contrast differences: It can line out the difference in the contrast waveform. Users can select it as their requirements and the default is non-activated.

Do Contrast automatically when being run: The two files will be contrasted automatically when being run.

9. Data Contrast (cont'd)

For this function, Data Contrast, we provide the SDK Development Tool for users. Users can customize the Data Contrast Interface according to their requirements. We has packed the Data Contrast UI as the GUI.DLL and designed an interface which is used for the communication between the GUI.DLL and Main Program. The GUI adopts the Non-modal Interface design, which can make the GUI Interface and Main Program Interface switch freely. When users activate the Data Contrast function, the software will search whether there is a GUI. DLL or not, then it can judge whether there is a user-defined Interface. If there is a user-defined Interface, the GUI.DLL will take effect; if there isn't, the embedded Data Contrast Interface will be activated.

Step 2 Display the contrast results in the Data Contrast dialog box.

After pressing Perform Contrast, it will display the contrast information in the contrast result. The below contents of the box are the contrast information. The information is relative simpleness; if users don't want to understand more details, you can know whether the signals of the two contrast files are completely the same or not.

Display the Contrast		less l
Results in the Data	Data Contrast Settings	×
<u>Contrast Settings</u> <u>Dialog Box</u>	Active Data Contrast	
	Contrast Files	
	Basic File 2.alc	•
	Contrast File 1.alc	-
	Contrast Beginning Point ————————————————————————————————————	ə
	• T Bar	
	O Beginning of Data	
	Contrast Result	Error Stat. 🔺
	A0[A0] FAIL	8
	A1[A1] PASS A2[A2] PASS	
	A3[A3] PASS	
	A4[A4] PASS	
	A5[A5] PASS	
	A6[A6] PASS	▼
	· · · · · · · · · · · · · · · · · · ·	
	Roll the contrast waveforms synchronization	Pin Assignment
	Display files the contrast differences	
	🔽 Display files horizontal	Perform Contrast
	Do contrast automatically when being run	
	Apply Close	Help

A0[A0].....FAIL: It indicates that there are differences in the channels of the two files.

B0[B0].....PASS: It indicates that there is no difference in the channels of the two files.

Step 3 Display the contrast results in the waveform windows. See the figure below.

It contrasts the two data files in the waveform area. The contrast waveform and the basic waveform are displayed horizontally; we can roll the mouse to contrast the waveform files; the difference of the waveforms will be lined out with the red wave line "~~~~~~" in the contrast files.

9. Data Contrast (cont'd)

<u>Display the Contrast</u> <u>Results in the</u> <u>Waveform Windows</u>

le Bys/Signal Trigge				/N:000000000001) - LaDoc3		
🗅 🥔 🖬 🥌 🖉	n, 🛛 🖗			🔲 128K 🕶 👬 🗰 21	00MHz 💌 🛲 🛛 50% 💌	👫 🐳 Page 🚺 💽 Cou
🕒 - 🛛 🕅 🚺	A	۵ 🖓 🖬	🗱 🗕 5ns		화 👪 🚺 🔄 🗠 🗍	Height 30 🗾 Trigger D
Font Size 12	*					
LaDoc3						
Scale:5ns Total:655.36us		Display Po: Display Ra	s:Ons inge:-125ns ~ 1	A Pos:-322.635us ▼ B Pos:-322.485us ▼	A - T = 322.635us ▼ B - T = 322.485us ▼	A - B = 150ns I▼ Compr-Rate:No
Bus/Signal	Trigger	Filter	100ns -		ış , , Ons , , , 25nş , , , 50nş	., 75ns , 100ns , 125ns
🖌 🖊 🗛	x ·	- 121				*****
🥖 A1 A1		12	h			
🧪 A2 A2		X				
🎸 A3 A3		X				
()	ITH	1 1	-			
LaDoc2						
Scale:5ns		Display Po: Display Ra	s:Ons inge:-125ns ~ 1	A Pos:-322.635us ▼ B Pos:-322.485us ▼	A - T = 322.635us ▼ B - T = 322.485us ▼	A - B = 150ns I▼ Compr-Rate:No
Total:655.36us		Filter		75ma 50ma .25a	ns , , , , , , , , , , , , , , , , , , ,	
Total:655.36us Bus/Signal	Trigger	Filler	-100ns			
1000 1100 100	Trigger		<u>, , 100ns</u>			
Bus/Signal						
Bus/Signal		-			<u> </u>	<u> </u>
Bus/Signal						

The Data Contrast function is available for the 321000 and 322000 Modules, and it is not available for the 16064, 16128 and 32128 Modules.

10. Refresh **Protocol Analyzer**

The Refresh Protocol Analyzer function enables the system to analyze the data between Ds and Dp again.

Basic Software Setup of Refresh Protocol Analyzer Click Tools on the Menu Bar, then select 🚉 or click 🚾 on the Tool Bar directly to refresh Step 1 Protocol Analyzer. Customize ... Refresh Protocol Analyzer Color Setting ... Bus Property ... Refresh Protocol Analyzer Multi-stacked Logic Analyzer Settings ... Analog Waveform Step 2 Transmit the tested Protocol Analyzer signal to the Logic Analyzer, for example Protocol Analyzer SPI. Waveform before Filte Refreshing 🥖 AO 🖌 Al N. \mathbb{N} \boxtimes / A2 Step 3 Choose Select an Analytic Range to select the analysis range, and drag Ds Bar to B Bar. Drag Ds Bar to B Bar Trigger Filter / Ar \otimes 🥖 A1 N \otimes / A2 ٠. Step 4 Click the Logic Analyzer will analyze the data between Ds and Dp. Filter Analyze the Data Between Ds and Dp / AO \boxtimes 52 🖌 A1 N \otimes / A2 Step 5. Click again, the waveform return the original state. Restore the **Original State** 🖌 AC N 🥖 A. \boxtimes

(C) The Refresh Protocol Analyzer function can come into effect, while the Ds and Dp are activated.

11. Memory Analyzer

Memory Analyzer enables the system to divide the packet format in the Protocol Analyzer and display the Address and Data in an independent list. It is better for understanding the relative relationship and status of the Address and Data in the operating process of the Protocol Analyzer. Users will know the operation when they use this function. It improves the efficiency of knowing the conditions.

Basic Software Setup of Memory Analyzer

Step 1	Click Tools on the Menu Bar, then select to activate the Memory Analyzer function.	
<u>Memory Analyzer</u> <u>Interface</u>	Waveform Display Image: Listing Display	
	Navigator	
	memory Analyzer	
	Bus Packet List	
	Statistics Window	
	Cascade	
	Horizontal	
	Vertical	
	Screen Display	
	✓ <u>1</u> LaDoc1	

Step 2 Open the Memory Analyzer dialog box.

<u>Memory Analyzer</u> <u>Dialog Box</u>	Memory An	1	>> Op	tion	Import	Export	Merge	Re	fresh	Reset	Display Alt	eration		M	×
	Bus1(I2C)	1													
	Address	Write d	ata	Read data											
		0	1	2	3	4	5	6	7	8	9	A	В	C	- 1
	0X00 0X10														- 1
	0X20								Compact Mo						- 1
									Complete Mo	ode					
	0X40														- 1
	0X50 0X60														- 1
	0X70														
															Ţ
	4														▶

1. Compact Mode and Complete Mode:

Click the Right Key in the memory analyzer dialog box; there are two modes for selecting, which are the Compact Mode and the Complete Mode. See the two different figures:

Compact Mode

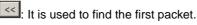
Address	Write d	ata I	Read data	3	4	5	6	7	8	9	A	В	С
0X00													
0X10				_									
0X20				✓	Compact M								
					Complete	Mode	Unu	sed:0X30/	-0X3F				
0X40													
0X50													
0X60													
0X70													

Complete Mode

		Write o		Read data											_
Addr		Data	Address	Data	Address	Data	Address	Data	Address	Data	Address	Data	Address	Data	A
OXC			0X01		0X02		0X03		0X04		0X05		0X06		
OX1			0X11		0X12		NX13		0X14		0X15		0X16		
OX2	20		0X21		0X22	Comp	act Mode		0X24		0X25		0X26		
						Comp	lete Mode								
OX4			0X41		0X42		UX43		0X44		0X45		0X46		
OX5	50		0X51		0X52		0X53		0X54		0X55		0X56		
OX6	50		0X61		0X62		0X63		0X64		0X65		0X66		
OX7	70		0X71		0X72		0X73		0X74		0X75		0X76		

2. Buttons:

Option...



: It is used to find the previous packet.

E It is used to find the next packet.

>>: It is used to find the last packet.

Analyzer; see the following Option dialog box: <u>Option Dialog Box</u> Uption

Option			×
Bar Assignme	ent		
	Reaction Bar	A	•
Active Displa	ay Assignment		
	Display Width	16	•
Color			
Addr		Data(R)	
Data(W)		Alteration	
	OK	Cancel	Default

Reaction Bar: The default is the A Bar; the added Bar can be displayed and selected in the pull-down menu if users have added a new Bar. The data position of the Reaction Bar will be displayed in the List Window of the Memory Analyzer.

: It is used to set the relative parameters for the List Window of the Memory

The Ds/Dp Bar and T Bar can't be displayed in the pull-down menu.

Display Width: It is used to set the display width of the List Window of the Memory Analyzer; the default is 16. Users can select the 4, 8, 16 and 32 from the pull-down menu, and they also can input a value between 1 and 100.

Color: Users can vary the color of Addr, Data(R), Data(W) and Alteration as their requirements. The default color of the Addr is black; the default color of the Data(R) is blue; the default color of the Data(W) is red; and the default color of the Alteration is gray.

Import... Export...

and ______: The Export function can select the TXT or EXCEL format to store the Data of the List Window of the Memory Analyzer; the Import function also can select the TXT or EXCEL formats to analyze the former export data.

Merge...

It can merge with the different export files. See the Merge dialog box below.

l	M	ler	ge	Dial	log	Box	

∎er ge		×
1	2	3
Object file:	C:\\10.txt	Open
File to merge:	C:\\11.txt	Open
	ОК	Cancel

Object File:

1. It is the covered file, that is to say, it is a new file.

2. It can display the path of the "Object File" and the file name.

3. It can open the "Object File" by clicking the "Open" option.

File to merge:

1. It can create the new file with the object file.

2. It can display the path of the "File to merge" and the file name.

3. It can open the "File to merge" by clicking the "Open" option.



Pressing this button can refresh the data status of each Address data when there are some alterations in the Bus Data



The data status of each Address will be cleaned out and returned to the original status by pressing the button.

Display Alteration

The Data in the List Window of the Memory Analyzer will be cleared by pressing this button and the List Window will display the alteration status of each cell. If the same Address has been written or read repetitively, the background of the cell will be gray and the list window will display the Data of the last packet. If the Address doesn't have any alteration, the Address Data will display the data of the Address without the background color. If it is the first time that the Address has been read, we confirm that the data of the packet has been altered.



: When users input the Address in this Edit Box and click the Find icon, it will go to the corresponding position which is highlighted by the Blue frame.

Step 3 Display the Memory Analyzer function in the waveform window.

M The Packet is read; the Address is 0X00A6; the Data are 0X0150, 0X01FA in sequence.

Memory Analyzer	PC-Based	onic Ana	lvzer 3212	8 Standard	1 V3.10(EN	11) (S/N:) -	[12f.als]								- D X
Display	Ele Bus/						Contraction of C		_	_					_ 8 ×
Display			. 2 2 (80)				100%	▼ M M ↓14 14↓1	Challe.	• m		202		1	Contra Co
		_			COLUMN DE LA COLUMN		100	The second second second	1.0.0			and the second	Pag		
	🕓 - 🕅		R	(7) III	🚟 🛛 2.0	182824u:	·	Bar Bar	Bar Bar B	👯 🛤 🗄	6 SI 📲	5 🔶 Hi	eight 3	0 💽	Trigger Delay
	Font Size	12	· ·												
	Scale:2.082	324us		Display Po	s:897.4497	74us	A Pos:-12	.9054ms		A - T = 1	2.9054ms		A-B=	: 6US 🔻	
	Total:26.214	4ms			inge:845.3		B Post-12	2.8994ms		B - T = 1	2.8994ms	s •	Comp	r-Rate:No	
	Bus/Sigr	al	Trigger	Filter	855.3	7932891866	.20741u876	621532(88)	7.035653(89	7.449774(9	07.863896(9	18.278017	928.692138	939.106259	1949.5203811
	EBu	1((20)	8.		1.1.1.1			s: 0×42	-	Write	and the second se	Data		nderndrykel het is	
		1(120)		1251	<u> </u>		Addres	55 . 0/42	<u> </u>	write	ATAC	Data .	0A4A		
		SDA		100											
	i in the second s	SCL /	100	53											
		22 C C C C C C C C C C C C C C C C C C	110000									J. I			
	- 🥖 A2	A2	\boxtimes	<u>×</u>											
	- ZA3	43 E	X	83											
	1.		86.58	BLUSK											
	4		• •	4 1	4										<u> </u>
	× << <	>	>> 00	tion	Import	Export	Merge	Re	fresh	Reset	Display Al	eration		64	
	Bus1(I2C)										1	1			
	Address	Write	1.1.2	Read data											
	Address	0	data 1	Read data	3	4	5	6	7	8	9	A	B	C	L D T
	0X00	0		00(89	0X9A	DICAB	OXBC	DXCD	OXDE	OXEF	0X69	DX7A	EXEB	0X9C	OXAD
	0×10	OXOA	OX1B	OX2C	0X3D	OXF7	OX08	0X19	OX2A	0X18	0X29	OX3A			
	0X20		1	OXFE	OXOF	0X20	0X31	0X42	0X53						
	0X40	r	1	BX4A	0X5B	BX6C	0)(79)	Unu	sed:0X30/	-0X3F	0X92	0XA3	1	r	r
	0X40		4	AHX0	UADE	UNDC	0870	UXSE	0770	0781	0X92	UXA3			0X49
		0X7C	0X8D	0X9E	0XAF	DXC0	0XD1	0XE2						21	
	0X60														
	0X60	0X47	0X58	0X69	OX7A	OX8B	0X9C	DXAD	OXBE	OXCF	.0XE0	0XF1	0X02	0X13	
			0X58	0X69	OX7A	OX8B	0X9C	OXAD	OXBE	UXCF	OXEO	OXF1	0X02	0X13	
	0X70		0X58	0X69	0X7A	0X8B	0X9C	OXAD	UXBE	UXCH	OXEO	OXF1	0X02	0X13	Ē
			0X58	0X69	0X7A	OX8B	0x9C	OXAD	UXBE	UXCE	OXEO	0XF1	OX02]	EMO

Step 2 Open the Memory Analyzer dialog box

<u>Memory Analyze</u> <u>Dialog Box</u>

lemory Anal	lyzer										
<< <	> >>	Reset	Refresh	Merge	Import	Export	Option	Display Alter	ation	<u></u>	i i
Bus1(HPI)											
Address	Write data	i Re	ad data								
	0	1	2	3	4	5	6	7	8	9	
							Unuse	ed:0X0000~	0X009F		
0X00A0											
					-		Unuse	ed:0X00B0~	0X013F		-
0X0140							E CONTRACTOR OF	✓ Compact M	lada		
0X0150											
0X0160								Complete	Mode		
0X0170											
							Unuse	d:0X0180~	DX01EF		
0X01F0											
					-	-	Unuse	ed:0X0200~l	DXFFFF		-

3. Compact Mode and Complete Mode:

Click the Right Key in the memory analyzer dialog box; there are two modes for selecting, which are the Compact Mode and the Complete Mode. See the two different figures:

Compact Mode

Address	Write data	Re	ad data								
	0	1	2	3	4	5	6	7	8	9	A
							Unusi	ed:0X0000~	0X009F		
0X00A0											
							Unus	ed:0X00B0~	0X013F		
0X0140											
0X0150											
0X0160											
0X0170											
							Unus	ed:0X0180~	0X01EF		
0X01F0											
							Unus	ed:0X0200~	OXFFFF		

xI

Complete Mode

emory Analy	yzer											>
<< <	> >>	Reset	Refresh	Merge	Import	Export	Option	Display Alterat	ion	M		
Bus1(HPI)												
	Write data	i Rei	ad data									-
Address	Data	Address	Data	Address	Data	Address	Data	Address	Data	Address	Data	
0X00A0		0X00A1		0X00A2		0X00A3		0X00A4		0X00A5		
0X0140		0X0141		0X0142		0X0143		0X0144		0X0145		_
0X0150		0X0151		0X0152		0X0153		0X0154		0X0155		_
0X0160		0X0161		0X0162		0X0163		0X0164		0X0165		_
0X0170		0X0171		0X0172		0X0173		0X0174		0X0175		_
												_
0X01F0		0X01F1		0X01F2		0X01F3		0X01F4		0X01F5		_
												_
												-
•												Ē
-												1

4. Buttons:

: It is used to find the first packet.

: It is used to find the previous packet.

: It is used to find the next packet.

: It is used to find the last packet.

Reset : The data status of each Address will be cleaned out and returned to the original status by pressing the button.

Refresh

: Pressing this button can refresh the data status of each Address data when there are some alterations in the Bus Data

Merge...

: It can merge with the different export files. See the Merge dialog box below.

Merge Dialog Box

<u>(</u>	erge			×
	1	2		3
	Object file:	C:\\10.txt		Open
	File to merge:	C:\\11.txt		Open
			ОК	Cancel

Object File:

1. It is the covered file, that is to say, it is a new file.

2. It can display the path of the "Object File" and the file name.

3. It can open the "Object File" by clicking the "Open" option.

File to merge:

1. It can create the new file with the object file.

2. It can display the path of the "File to merge" and the file name.

3. It can open the "File to merge" by clicking the "Open" option.



and _____: The Export function can select the TXT or EXCEL format to store the Data of the List Window of the Memory Analyzer; the Import function also can select the TXT or EXCEL formats to analyze the former export data.

Option...: : It is used to set the relative parameters for the List Window of the Memory Analyzer; see the following Option dialog box:

Option Dialog Box

ent		
Reaction Bar	A	•
y Assignment		
Display Width	16	•
	Data(R)	
	Alteration	
OK I	Cancel	Default
	Reaction Bar y Assignment Display Width	Reaction Bar A y Assignment Display Width 16 Data(R) Alteration

Reaction Bar: The default is the A Bar; the added Bar can be displayed and selected in the pull-down menu if users have added a new Bar. The data position of the Reaction Bar will be displayed in the List Window of the Memory Analyzer.

Note: The Ds/Dp Bar and T Bar can't be displayed in the pull-down menu.

Display Width: It is used to set the display width of the List Window of the Memory Analyzer; the default is 16. Users can select the 4, 8, 16 and 32 from the pull-down menu, and they also can input a value between 1 and 100.

Color: Users can vary the color of Addr, Data(R), Data(W) and Alteration as their requirements. The default color of the Addr is black; the default color of the Data(R) is blue; the default color of the Data(W) is red; and the default color of the Alteration is gray.

Display Alteration

: The Data in the List Window of the Memory Analyzer will be cleared by pressing this button and the List Window will display the alteration status of each cell. If the same Address has been written or read repetitively, the background of the cell will be gray and the list window will display the Data of the last packet. If the Address doesn't have any alteration, the Address Data will display the data of the Address without the background color. If it is the first time that the Address has been read, we confirm that the data of the packet has been altered.



When users input the Address in this Edit Box and click the Find icon, it will go to the corresponding position which is highlighted by the Blue frame.

Step 3 Display the Memory Analyzer function in the waveform window.

Mamony Analyzar	PC-Based Logi	naluzer 3212	8 Standard	V3 10/CN	11)/S/N-)-	FT2C alc1								- 0 :
<u>Memory Analyzer</u>	Eile Bus/Signa				Contraction of the local division of the loc	[Inserting]								그리
<u>Display</u>			۰ ۱۹ ۲۳ ۹۳		> >> ====	128K	▼ ₩4 ₩1	5MHz	• n	r .mr 51	0% -	🍖 🐳 Pa	iqe 1	Count
	🕟 - 🕅 🎟		0 🗰 🛙	- 2.0	182824u:					6 SI 8	5 🔶 F	leight	30 -	Trigger Dela
	Font Size	2 -												
	Scale:2.082824u Total:26.2144ms		Display Pos Display Rar			A Pos:-12 B Pos:-12				2.9054ms			= 6us 🔻 pr-Rate:No	
				nge.043.31	3100	DF0512				2.09941113	> *	Com	private.ino	
	Bus/Signal	Trigger	Filter	855.	7932894866.	20741u,876	621532(88)	7.035653(89	7.449774.9	07.8638964	91,8.278017	71,92,8.6921.3	8,939.10625	a,949.520381 <mark>7</mark>
	Bust (12	C) 🛛 -				Addres	s:0×42	2 1	Write	A-AC	Data	:0×4A		-
	🧹 🖌 st													ĺ
	🖌 🖌		\boxtimes		Π						Π			
	- A2 A2								-					
	🏹 🗛 🖓													
	4		4 T) I	4					nananan fi) I
	×		and and in		Export	1	10	fresh	-	Display Al	have black			
	~ < <	> >> Ot	tion I	mport									「花花	
					Export	Merge	Re	rresn	Reset	[[Lospiay M	ceración		64	
	Bus1(I2C)				Export	Merge	Re	mesn	Reset		teration	-	M	
	Address V	Vrite data	Read data							0		1	M	
	Address V	Vrite data	2	3	4	5	6	7	8	9	A	B		
	Address V	0 1	2 0X89	3 0X9A	4 OXAB	5 OXBC	6 OXCD	7 OXDE	8 OXEF	9 0X69	A OX7A	B	C 0X9C	D OXAD
	Address V		2	3	4	5	6	7	8	9	A			10
	Address V 0X00 0X10 0 0X20	0 1	2 0X89 0X2C 0XFE	3 0X9A 0X3D 0X0F	4 0XAB 0XF7 0X20	5 0XBC 0X08 0X31	6 0XCD 0X19 0X42 Unu	7 0XDE 0X2A 0X53 sed:0X30	8 0XEF 0X18 ~0X3F	9 0X69 0X29	A OX7A			10
	Address V 0X00 0X10 0 0X20 0X40	0 1	2 0X89 0X2C	3 0X9A 0X3D	4 OXAB OXF7	5 0XBC 0X08	6 0xCD 0x19 0x42	7 0XDE 0X2A 0X53	8 OXEF OX18	9 0X69	A OX7A			OXAD
	Address V 0X00 0X10 0X20 0X40 0X50	0 1 XOA 0X1B	2 0X89 0X2C 0XFE 0X4A	3 0X9A 0X3D 0X0F 0X5B	4 0XAB 0XF7 0X20 0X6C	5 0XBC 0X08 0X31 0X7D	6 0XCD 0X19 0X42 Unu 0X8E	7 0XDE 0X2A 0X53 sed:0X30	8 0XEF 0X18 ~0X3F	9 0X69 0X29	A OX7A OX3A			10
	Address V 0X00 0X10 0X20 0X40 0X40 0X50 0X60 0X60	0 1 X0A 0X1B X7C 0X8D	2 0X89 0X2C 0XFE 0X4A 0X9E	3 0X9A 0X3D 0X0F 0X5B 0XAF	4 0XAB 0XF7 0X20 0X6C 0XC0	5 0XBC 0X08 0X31 0X70 0X70	6 0xCD 0x19 0x42 Unu 0x8E 0xE2	7 0XDE 0X2A 0X53 sed:0X30 0X70	8 0XEF 0X18 ~0X3F 0X81	9 0X69 0X29 0X92	A 0X7A 0X3A 0XA3	OX88	C DX9C	OXAD
	Address V 0X00 0X10 0X20 0X40 0X40 0X50 0X60 0X60	0 1 XOA 0X1B	2 0X89 0X2C 0XFE 0X4A	3 0X9A 0X3D 0X0F 0X5B	4 0XAB 0XF7 0X20 0X6C	5 0XBC 0X08 0X31 0X7D	6 0XCD 0X19 0X42 Unu 0X8E	7 0XDE 0X2A 0X53 sed:0X30	8 0XEF 0X18 ~0X3F	9 0X69 0X29	A OX7A OX3A			OXAD
	Address V 0X00 0X10 0X20 0X40 0X40 0X50 0X60 0X60	0 1 X0A 0X1B X7C 0X8D	2 0X89 0X2C 0XFE 0X4A 0X9E	3 0X9A 0X3D 0X0F 0X5B 0XAF	4 0XAB 0XF7 0X20 0X6C 0XC0	5 0XBC 0X08 0X31 0X70 0XD1	6 0xCD 0x19 0x42 Unu 0x8E 0xE2	7 0XDE 0X2A 0X53 sed:0X30 0X70	8 0XEF 0X18 ~0X3F 0X81	9 0X69 0X29 0X92	A 0X7A 0X3A 0XA3	OX88	C DX9C	0XAD 0X49
	Address V 0X00 0X10 0X20 0X40 0X40 0X50 0X60 0X60	0 1 X0A 0X1B X7C 0X8D	2 0X89 0X2C 0XFE 0X4A 0X9E	3 0X9A 0X3D 0X0F 0X5B 0XAF	4 0XAB 0XF7 0X20 0X6C 0XC0	5 0XBC 0X08 0X31 0X70 0XD1	6 0xCD 0x19 0x42 Unu 0x8E 0xE2	7 0XDE 0X2A 0X53 sed:0X30 0X70	8 0XEF 0X18 ~0X3F 0X81	9 0X69 0X29 0X92	A 0X7A 0X3A 0XA3	OX88	C DX9C	OXAD

d The Packet is read; the Address is 0X42; the Data are 0X4A, 0X5B in sequence.

12. Multi-stacked Logic Analyzer Settings

The function of the Multi-stacked Logic Analyzer Settings is mainly for connecting the hardware of many Logic Analyzers which are the same type, and then use the software to stack the Logic Analyzers which are working independently. It can improve the functions of the Logic Analyzer, which are mainly manifested in two aspects, expanding the RAM Size and adding the number of the test channels.

a) 1. The max. number of the Multi-stacked Logic Analyzers is four. The RAM Size of the four Logic Analyzers can reach to 128K*4 and the test channels of the four Logic Analyzers can reach to 32*4.

2. The function of the Multi-stacked Logic Analyzer Settings is available for the 32128, 321000 and 322000 Modules, and it is not available for the 16064 and 16128 Modules.

Basic Software Setup of Multi-stacked Logic Analyzer Settings

Step 1 Click Tools on the Menu Bar, then select El to activate the function of Multi-stacked Logic Analyzer Settings.

Customize ... Multi-stacked Logic Analyzer Settings Color Setting ... Interface BUS Bus Property ... Refresh Protocol Analyzer Multi-stacked Logic Analyzer Settings ...

Analog Waveform

Step 2. Click is to open Multi-stacked Logic Analyzer Settings dialog box.

ulti-stacked Logic Analyzer Settings × Multi-stacked Logic Analyzer Settings 🔽 Activate Stack **Dialog Box** -Stack Type 🔿 Memory Stack • Channel Stack Please select the Logic Analyzer for stacking M1 S/N:00000-0000 TM2 S/N:000000-0000 □M3 S/N:00000-0000 M4 S/N:000000-0000 -Synchronous Channel AO --Synchronous Trigger Condition Rising Edge -OK Cancel Help

12. Multi-stacked Logic Analyzer Settings (cont'd)

Activate Stack: Click the checkbox to activate the function of the Multi-stacked Logic Analyzer; the default is non-activated.

Stack Type: Users can select the Memory Stack and Channel Stack; the default is the Channel Stack.

Please select the Logic Analyzer for stacking: It can display all the connected Logic Analyzers and the S/N code of them. The M1 indicates the first Logic Analyzer and the M2 indicates the second Logic Analyzer; M3 and M4 are similar to the previous. Users should select two or more Logic Analyzers, but the most analyzers users can select is four.

Synchronous Channel: Select the synchronous channel form the pull-down menu. The default synchronous channel is A0.

Synchronous Trigger Condition: Select the synchronous trigger condition. Users can select the Rising Edge, Falling Edge, High and Low from the pull-down menu. The default is the Rising Edge. The function of the Synchronous Trigger Condition can only be used in the Channel Stack, that is to say, it is disabled in the Memory Stack.

Step 3 Display the function of Multi-stacked Logic Analyzer in the Memory Stack.

There are two Logic Analyzers to do the Memory Stack; the Synchronous Channel is A0; the data on the left of A Bar is captured by the first Logic Analyzer, the data on the right of A Bar is captured by the second Logic Analyzer.

6 2 3 1	II, IX, (11)	9 ¹	澤 諷 🕨 🕪 🗆 128K 🔹 🏭 200MHz 🔹 🚥 🦷 50% 🔹 🏤 🀳 Page 1 🕑 Count 1 💌
🔞 💷 🕯	8 A 8	🖑 🛍	📓 - 0.58122725 - 🐹 🏆 🔜 🕵 🔛 🐹 👹 1♦ ♦/ = Height 28 - Trigger Delay 1
Scale:172.0497718 Fotal:262144			lay Pos:66028 A Pos:66023 → A - T = 66063 + A - B = 130560 + lay Range:61727 ~ 70330 B Pos:-64497 + B - T = 64497 + Conpr-Rate:No
Bus/Signal	Trigger	Filter	52587.303 63447.352 64307.8 65168.049 66028.298 66888.547 67748.796 68609.045 69469.294 705
🧪 📶 (SYHC)	× 🔊		262144
🖌 🖌 🕺	Z	\otimes	491 490 490 489 490 489 491 460 516 978 980 981 980
📝 A2 32	121		262144
🍝 A3 33	12	\otimes	262144
🖌 🗛 🕺	183	0	262144
🧪 AS 35	\boxtimes	\otimes	262144
🖌 A6 35	1231	0	262144
# A7 3.7		\otimes	262144
🖌 BO BO	8	0	262144
🏏 B1 B1		\otimes	262144
🖌 B2 B2	123	0	262144
🥑 83 (83		\odot	262144
🖌 B4 - B4	181	8	262144

Step 4 Display the function of Multi-stacked Logic Analyzer in the Channel Stack.

There are two Logic Analyzers for Channel Stack; the Synchronous Channel is A0; the Synchronous Trigger Condition is the Rising Edge; the former 32 channels (A0~A7, B0~B7, C0~C7, D0~D7) change into the 64 channels (A0~A7, B0~B7, C0~C7, D0~D7, E0~E7, F0~F7, H0~H7, I0~I7) channels.

			lard ¥3.10(EN01) (S/N:) - [LaDoc1] a]ools Window Help		
0 6 8 5 5		*' *' * (*)	Image: Second	nn 50% • 🚸 🚸 Page 1 • Count 1 •	
Bus/Signal	Trigger	Filter	-7599.088 -5214.518 -2829.548 -444 77	8 1939.991 4824.761 6709.581 9094.801 11479.071 13	380
— 🧪 м (SYNC)	1.		54658		Ť
🥖 🗚 🗛 M1	\otimes	\otimes	56129	1960 1959 1962 1957 1963 1957	19
🎽 A2 A2 M1	8	0		120195	
🧭 🗚 🔥 M1	8	0		120195	
🖌 🗛 🗛 M1	8	0		120195	
📝 AS AS M1	\otimes	0		120195	
🖌 🗚 🗛 MI	0	0		120195	
🖋 A7 A7 M1	\otimes	\otimes		120195	
🖌 BO BO MI	8	0		120195	
🥖 B1 B1 M1	\otimes	\otimes		120195	
🕖 B2 B2 M1	8	0		120195	
💋 B3 B3 M1	\otimes	\otimes		120195	
💉 B4 B4 M1	8			120195	
	4 D	4 Ĭ >	I		•
udy				End! Connected	

Technical Specifications

Charact	toristics	
	ensucs	Specifications
Inter	face	USB 2.0 (1.1)
Operating	g System	Windows 2000 / Windows XP / Windows Vista / Windows 7
Power S	Supply	USB 1.1 (USB 2.0 recommended)
Chan	nels	16
	nternal Clock Rate asynchronous)	100Hz ~ 200MHz
Rate	Max External Clock synchronous)	max. 100MHz
	Bandwidth	75MHz
	Memory	4M Bits
Memory (r	Memory Depth per Channel)	128K Bits
	Trigger Channel	16 Channels
	Trigger Condition	Pattern / Edge
Trigger	Pre-Trigger Post-Trigger	yes
	Trigger Level	1 Level
-	Trigger Count	1~65535
Threshold Voltage	Working Voltage	-6V~+6V
voltage	Accuracy	± 0.1V
Protocol	I2C	integrated
Analyzer	UART	integrated
(keep increasing)	SPI	integrated

Technical Specifications (cont'd)

Chara	acteristics	Specifications
	7-SEGMENT LED	integrated
	Operating Interface Language	Chinese (Si) / Chinese (Tr) / English
	Time Base Range	5ps~10Ms
	Vertical Sizing Compression	1~5.5
Software		max. 32Mbits
Function	Waveform Width Display	yes
	Trigger Page	1~8192 Page
	Double Mode	yes
	Multi-stacked Logic Analyzer Settings	no
Safety C	Certification	FCC / CE / WEEE / RoHS

The grayed fields are optional in the software and non available.

Technical Specifications (cont'd)

Electrical Specification

Items	Minimum	Typical	Maximum
		. ypiour	Maximum
Working Voltage	DC 4.5 V	DC 5.0 V	DC 5.5 V
Current at Rest			200 mA
Current at Work			400 mA
Power at Rest			1 W
Power at Work			2W
Error in Phase Off*			1.5 nS
V _{input} of Testing Channel	DC -30V		DC 30 V
V _{Reference}	DC -6V		DC 6 V
Input Resistance		500KΩ/10pF	
Working Temperature	5°C		70℃
Storage Temperature	-40℃		30°C

General Specifications

Environment	Reference temperature	18°C to 28°C	
	 Operating temperature 	0°C to 40°C	
	 Storage temperature 	- 20℃ to + 60℃	
	 Utilisation 	indoors	
	Altitude	< 2,000 m	
	Relative humidity	< 80 % up to 31℃	
Mains power supply	 Mains voltage 	Use nominal range 100 to 240 VAC	
	 Frequency 	from 47 to 63 Hz	
	 Consumption 	< 16 W at 230 VAC, 50 Hz	
	Fuse	2.5 A / 250 V / delayed	
	Detachable mains power cable		
Safety	As per IEC 61010-1 (2001):		
	 Insulation 	class 1	
	Degree of pollution	2	
	Category of power supply overvoltage: CAT II 240 V		
	 "Measurement" input overvoltage category CAT II 300 V 		
CE			
	This equipment is designed to conform to current EMC standards and its compatibility has been tested as per NF Standard EN 61326-1 + A1 :		
	field of Influence	Influence quantity: 5 mV in the presence of a magnetic field of 3 V/m Influence quantity: 10 mV in the presence of a magnetic field of 10 V/m	

Mechanical Specifications

Casing

- 270 x 213 x 63 (in mm) • Dimensions
- Weight

1.8 kg

- Materials • Sealing

ABS VO (self-extinguishing) IP 30

Packaging

• Dimensions

300 (I) x 330 (L) x 230 (D) in mm

Supply

Accessories

- Logic Analyzer x 1
- User's manual CD x 1
- 8-Pin Testing Cable x 2
- Probe x 20
- USB Cable x 1
- Installation Guide x 2
- Driver CD** x 1
- 1-PinTesting Cable (White) x 1
- 2-Pin Testing Cable (Black) x 1
- Safety cables x 5
- Simplified connecting card x 1