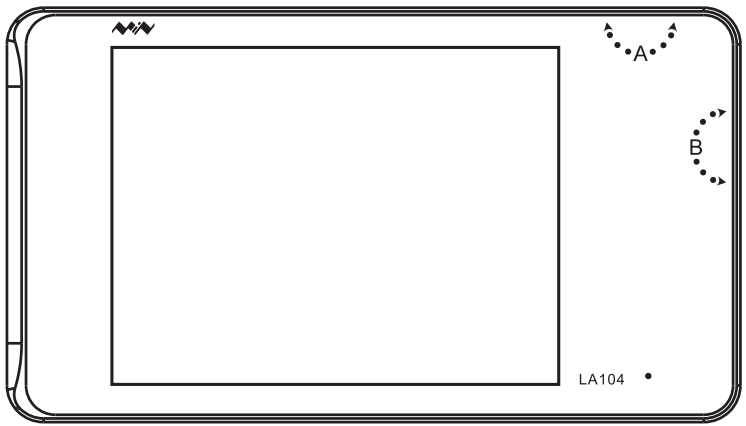


LA104 Logic Analyzer User Manual V1.0

Please read this manual before using this device.
This user manual is based on APP1.01.

目　　录

1 Safety Statement

In order to ensure the correct and safe use of this product, please read and comply with the following safety precautions.
Damage caused by any violations of the following safety precautions will be borne by User.

1. Safety Statement

Read carefully all the following safety precautions to avoid personal injury and prevent damage to the device or any products connected to it.

1.1 Use proper power cord

Please use power cord specified for this product and certified for your country/district of use.

1.2 Comply With All Terminal Ratings

To avoid fire or electric shock, please comply with all terminal ratings and marking instructions, avoiding damaging the device. Before connecting devices, please consult the product manual or product label first to know the information about the ratings.

1.3 Connect and Disconnect Measuring Cables Correctly

Before connecting/disconnecting measuring cables, please turn off the power of the measured circuit, turn on the power after correctly connecting.

1.4 Use Proper Over Voltage Protection

Make sure no over voltage (such as voltage caused by lightening) can reach the device, otherwise, user may get an electric shock.

1.5 Do Not Operate With Opening Back Case

1.6 Avoid Exposure of Circuit

When Power is on, do not touch the exposed joints or components.
If suspect failure of device, stop operating device. Please contact your seller for product testing, maintaining, adjustment or parts replacing.

1.7 Do Not Operate in Wet or Inflammable/Explosive Conditions

1.8 Keep Product Surface Clean And Dry

1.9 Take On Antistatic Protection

Static electricity may cause damage to device, please operate in antistatic space.
When connecting devices, both internal and external conductors should be earthed briefly to release static electricity.

2. Product Operation Attentions

- Keep away from bad environment. Keep away from direct sunlight, heat sources, heavy smoke, steam, corrosive or flammable gases, strong magnetic sources, high pressure equipment or power lines, water, oil, chemicals or places alike;
- Environmental temperature and environmental humidity. Suitable temperature: 10~50℃, humidity: 10~90%RH.

2 Product Introduction

1. Brief Introduction

LA104 is a compact, portable logic analyzer with a display screen. It is widely applied to a variety of industries and fields, such as automotive electronics, communication, power supply and computer.

2. Function

Logic analyzer is used to analyze the logic relationship of digital systems, as it can collect and store multichannel digital signals and directly display their sequential relationship on the screen. The logic analyzer is equipped with the function of protocol analysis, and can parse logic signal of the protocol's physical layer into data of the high layer protocol and display them on the screen.

3. Parameters

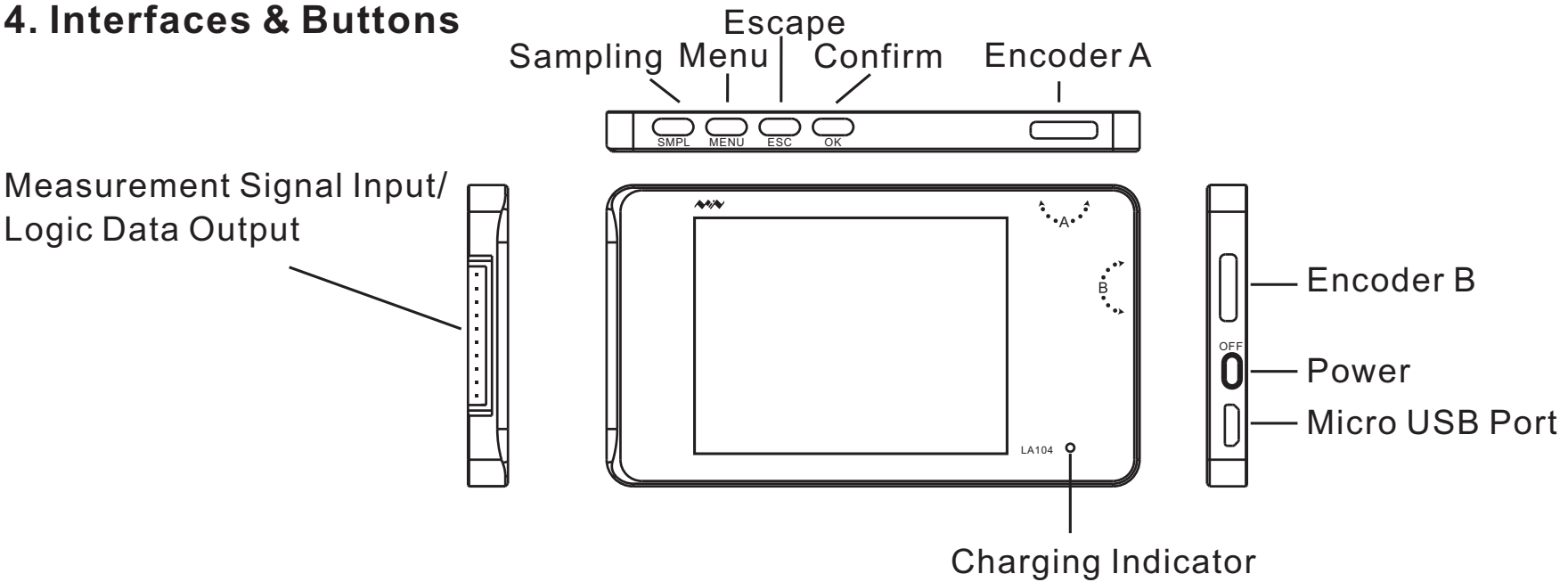
Measuring Input Parameters	Channel	4
	Max Sampling Rate	100M Sa/S
	Min Captured Pulse width	10ns
	Input Voltage Range	0-5V
	Equivalent Input Impedance	1MΩ
	Threshold Voltage	1.2-3V
Output Parameters	Programmable Output Channel	4
	Programmable Output Type	PWM,SPI,I2C,UART
	Programmable Output Amplitude	3V
	3V Power Output Channel	1

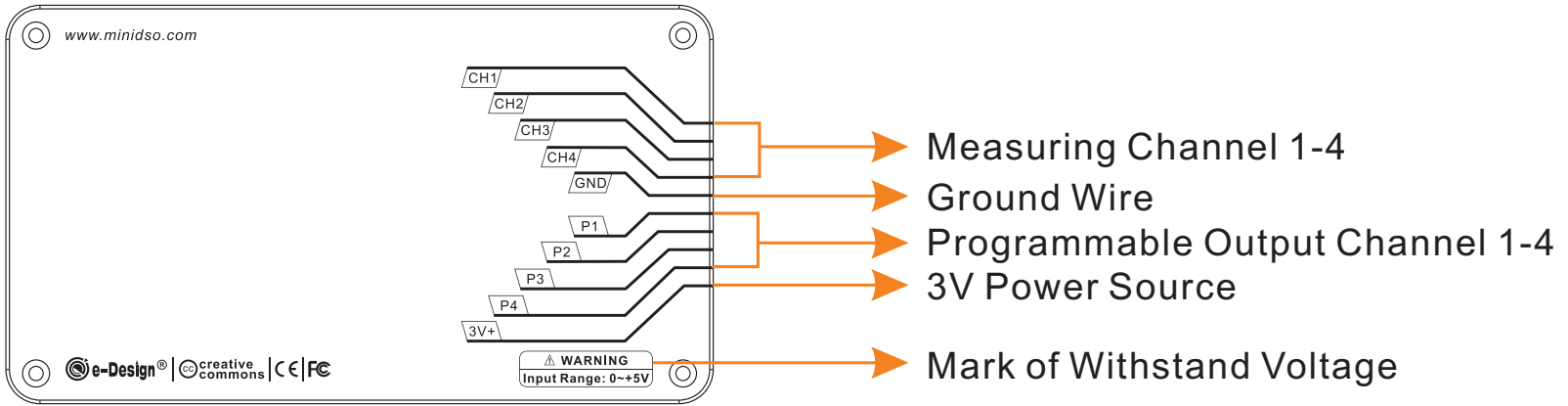
Fig 2.1 Functional Parameters

Storage	Built-in 8M Flash Storage
Battery	Built-in 500mAh Lithium Battery
Display	2.8'' Color LCD Screen
Size	100mm*56.6mm*8.4mm

Fig 2.2 Product Specifications

4. Interfaces & Buttons



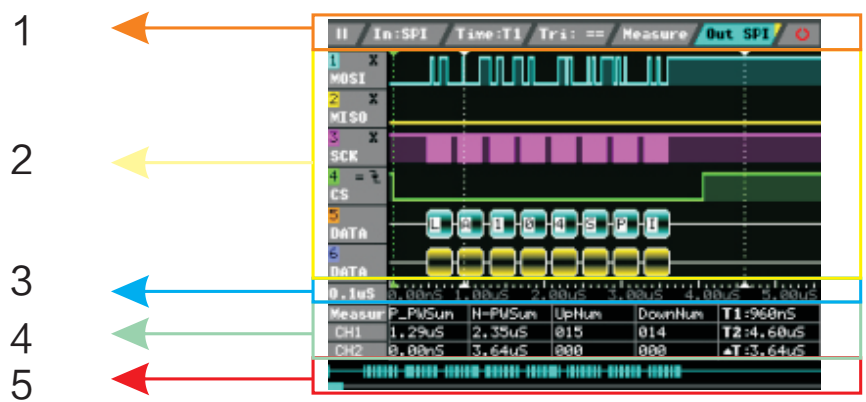


Buttons	Functions
⏻	Power On/Power Off (If the device is automatically power off, turn off the device then turn on again)
⇄	Charging, connecting PC for reading data
SMPL	Collect/Pause
MENU	Option Menu
ESC	Quit
OK	Confirm/Execute
Encoder A	Left/Right Choosing
Encoder B	Up/Down Choosing

Buttons	Quick Functions
OK	Switch Menu Options of Time
Encoder B	Increase/Decrease the Option Value of Current Time Menu
SMPL+OK	Save Current Screen Picture (Not Collecting)
OK+Encoder B-Up	Continuously Increase the Option Value of Current Time Menu
OK+Encoder B-Down	Continuously Decrease the Option Value of Current Time Menu

3 Interface

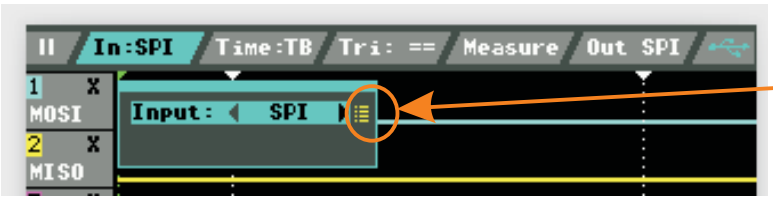
1. Main Interface



	Name	Description
1	Main Menu Bar	Display sampling status, main menu and power
2	Waveform View	Display information and waveform of each channel
3	Ruler	Timing Ruler
4	Measuring Zone	Display Pulse Width, number of Edges and Time Difference
5	Waveform Thumbnail	Thumbnail of Collected Data

1.1 Mark Description

Yellow mark indicates Hidden Menu Option on the right.



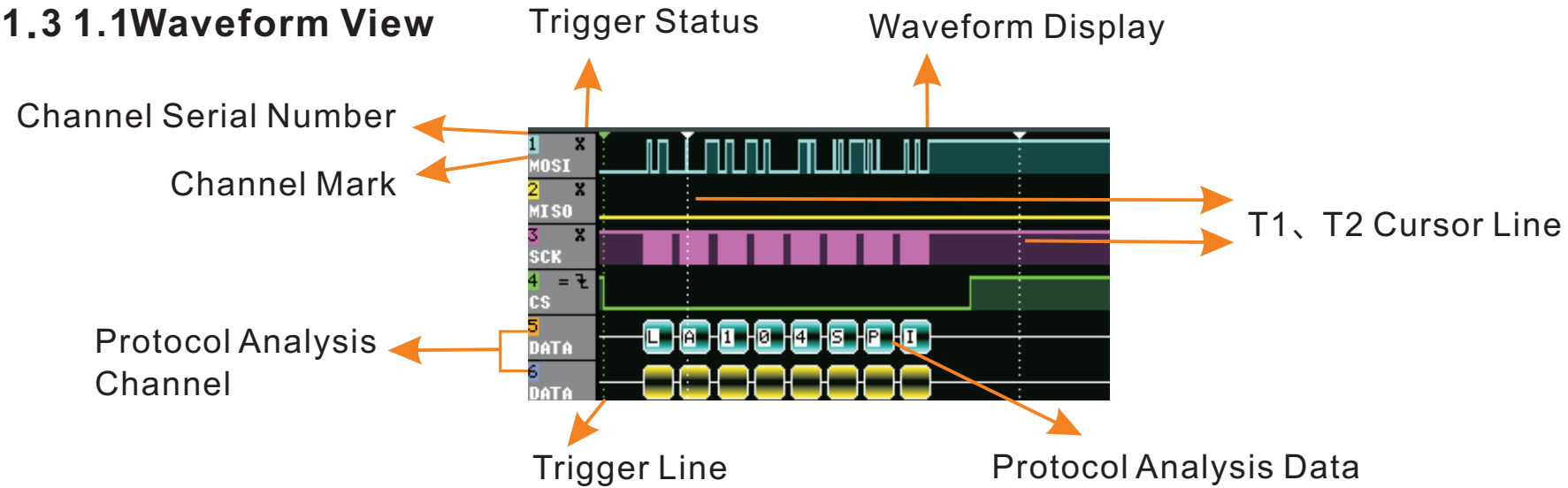
Yellow menu indicates Submenus under this Option; press “MENU” and slide the Encoder “A” to select Submenu.

Blue button indicates pressing “OK” to execute and switch data.

1.2 1.1Main Menu Bar

/	Pause/Collect Data
In:SPI	Setting Options for collecting Input Protocol
Time:TB	Time Scale, Cursor and Horizontal Window Options
Tri:==	Trigger Option
Measure	Measurement Option
Out SPI	Programmable Port Option
FileSys	File System Option
Setting	System Configuration Option
/	Power/Charge, PC Connection Status

1.3 1.1Waveform View



1.4 Ruler

Current Min. Unit of Ruler

1.5 Measurement Zone

Measur	P_PWSum	N-PWSum	UpNum	DownNum	T1:1.00uS
CH1	1.27uS	2.33uS	015	014	T2:4.60uS
CH2	3.60uS	0.00mS	000	000	▲T:3.60uS

CH1	Current Measuring Channel
P_PWSum	Total Time of Positive Pulse Width of T1 and T2
N-PWSum	Total Time of Negative Pulse Width of T1 and T2
UpNum	Number of Rising Edges of T1 and T2
DownNum	Number of Falling Edge of T1 and T2
T1:1.00us	T1 Time
T2:4.60us	T2 Time
▲T:3.60us	Time Difference between T1 and T2

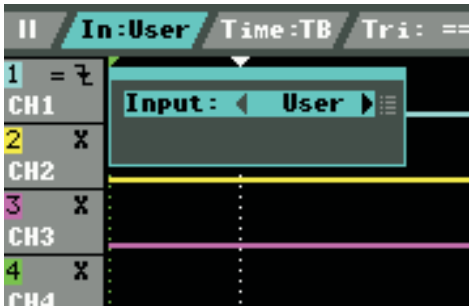
1.6 Waveform Thumbnail

Waveform Thumbnail of Collected Data

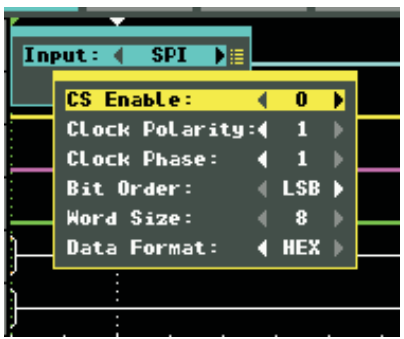
Slider: Green Slider indicates the position of the current Waveform View in Collected Waveform; Grey Slider indicates no Collected Waveform currently.

2. Menu Options Introduction

2.1 User-defined Protocol Analysis Option



2.2 SPI Protocol Analysis Option

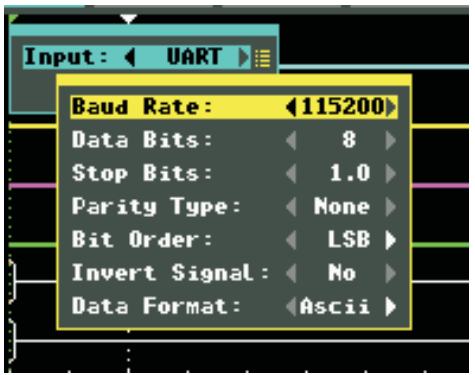


CS Enable	CS (Chip Select) Enabling Conditions: 0 indicates Low Level Enabling; 1 indicates High Level Enabling
Clock Polarity	Clock Polarity: 0 indicates Low Level; 1 indicates High Level
Clock Phase	Clock Phase: 0 indicates to read data on the first Saltus; 1 indicates to read data on the second Saltus
Bit Order	Data Bit Sequence: LSB indicates Least Significant Bit in the front; MSB indicates the Most Significant Bit in the front
Word Size	Data Length
Data Format	Displaying Format of Analysis Data

2.3 12C Protocol Analysis Option

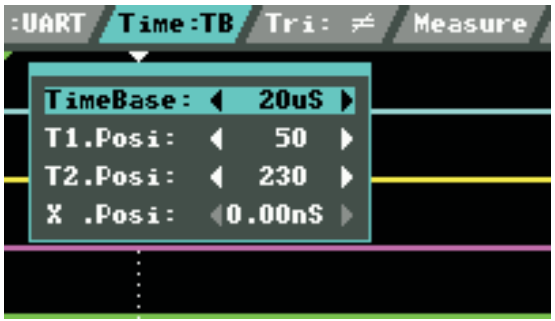
R/W bit set 0	Set Reading/Writing Bit when Addressing
Data Format	Displaying Format of Analysis Data

2.4 UART Protocol Analysis Option



Baud Rate	Baud Rate
Data Bits	Data Bits
Stop Bits	Stop Bits
Parity Type	Calibration Setting
Bit Order	Data Bit Sequence
Invert Signal	Invert Signal
Data Format	Displaying Format of Analysis Data

2.5 Time Option

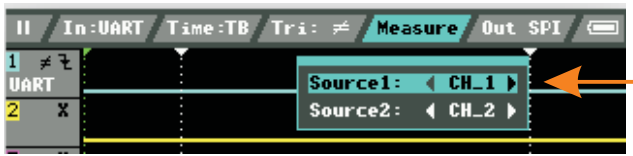


Time Base	Min. Unit of Ruler
T1.Posi	Position of Cursor T1
T2.Posi	Position of Cursor T2
X.Posi	Waveform Offsetting Time

2.6 Trigger Options

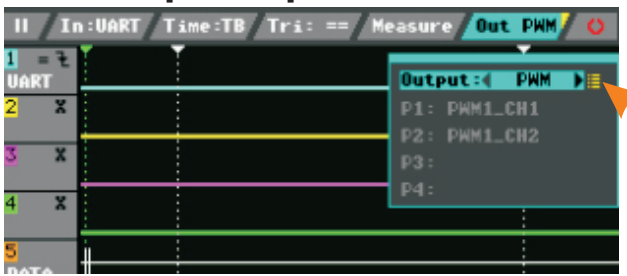
Tri Type	NE_CM/EQ_CM/ Any/LNE_W/ LEQ_W/GNE_W/ GEQ_W	Not equal/Equal to Combination Condition Trigger/Arbitrary Trigger/Not equal/ Equal to Continuous Pulse Width less than Threshold Value Trigger Incompatible/Compatible with Continuous Pulse Width larger than Threshold Value Trigger
TriCond	Channels 1-4 Condition	Rising Edge/Falling Edge: Corresponding to Channels 1-4 from left to right
TriMask	Channels 1-4 Combination Settings	√ indicates selecting this Channel; × indicates this Channel does not Trigger Condition: Use Encoder “A” to Select Channel and then press “OK” to Switch
TriWidth	Trigger Pulse Width	
Threshold	Settings of Level Threshold Value	

2.7 Measurement Options



Select a Measurement Channel

2.8 Output Options



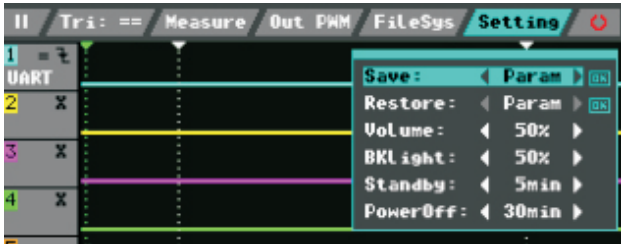
Select the Programmable Output Type: SPI, 12C, UART, PWM

2.9 File Saving Options

Save Bmp: Save the Current Screen Image with the Number as File Name

Save Csv: Save Collected Data with the Number as File Name

2.10 System Setting Option

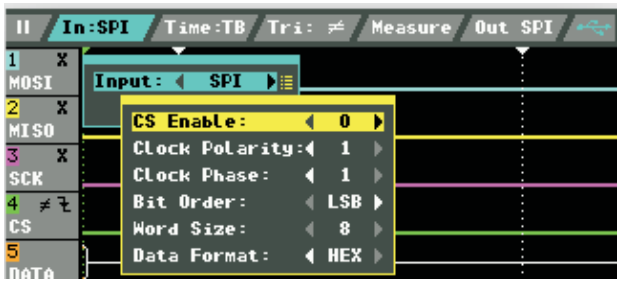


Save param	Save Current Option Parameters
Restore param	Reset to Defaults
Volume	Buzzer Volume
BKlight	LCD Backlight Brightness
Standby	Standby Time
Power off	Auto Power-off Time

4 Detailed Instructions

1. Interface Settings

1. Select the Protocol Type or User-defined Type for the Measured Signal



2. Set the Parameters for all the Options under the Protocol

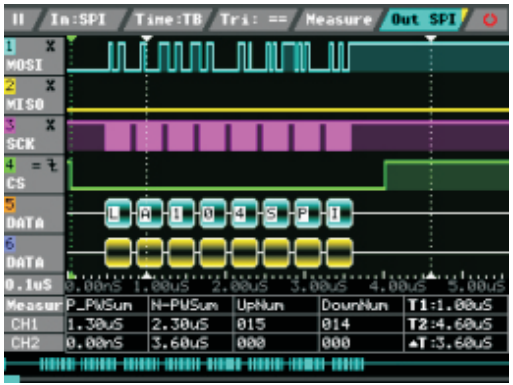
3. Set the Triggering Conditions for the measured Signals (all the Protocol Types have their own corresponding Triggering Setting).

2. Connect Measuring Cable

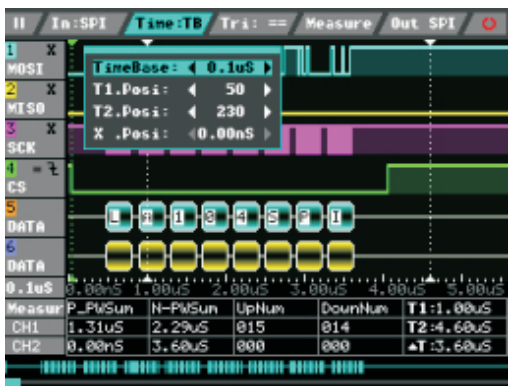
1) Connect LA104's Ground Wire (GND) with the ground wire of the Measured Device;
2) Connect LA104's Input Channels with the Pins to be measured.

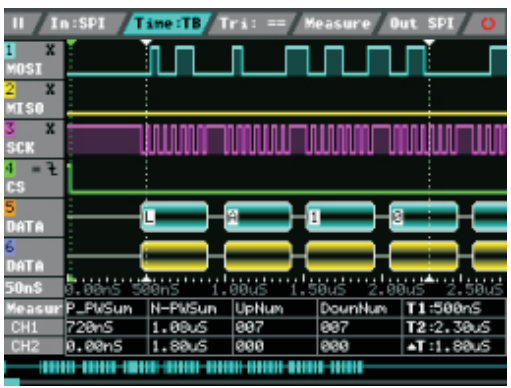
- Be careful when plugging/unplugging the Measuring Cable to avoid damaging the Measured Device or this product.
- Don't measure Signals beyond the Level Measuring Range of LA104.
- LA104 can't measure Signals with frequency higher than its max collected frequency.

3. Collection Analysis



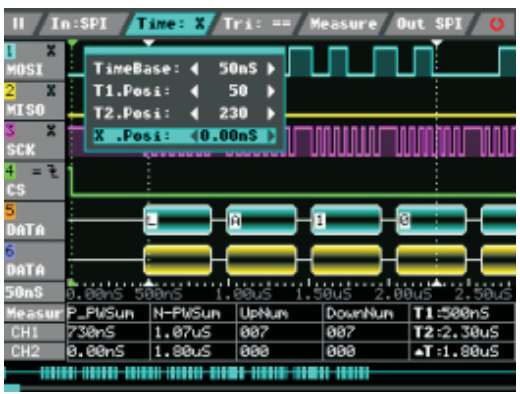
1) Slid Encoder A to “Out SPI” and press the “SMPL” button to begin collecting.Pres “OK” to send out Signal, and check the Waveform after some time;

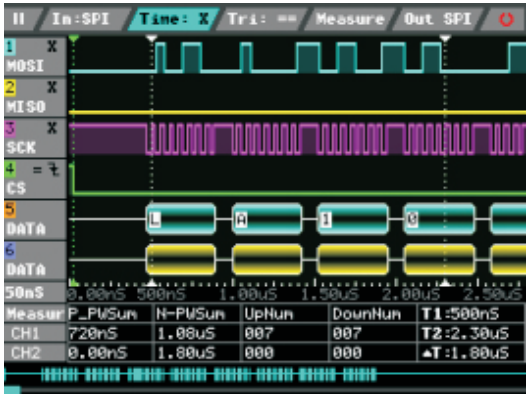


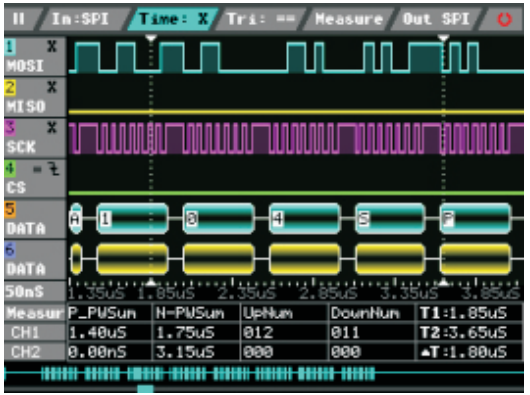


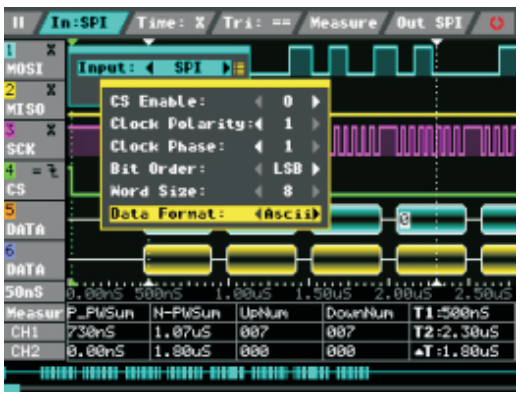
2) Adjust the TimeBase Parameters to the right Waveform Ratio;

3) Moving X. Posi to the Waveform of the Period you want to observe;

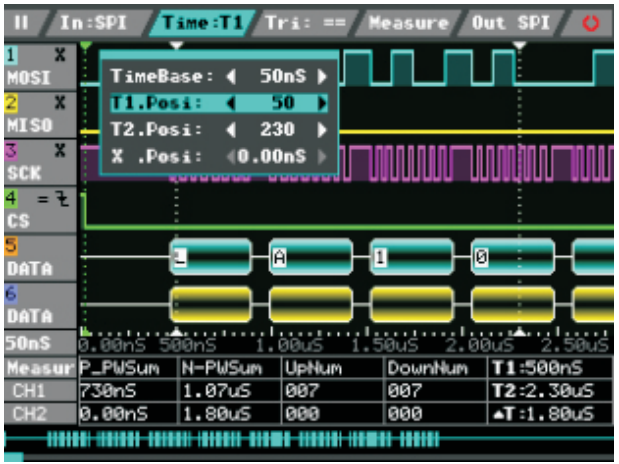








4) Settings of Protocol Analysis;
Select the Data Type you want to check in the Protocol's Submenus;



5) Check the Measured Data;
Check the Measured Data between T1 and T2 by adjusting the positions of Cursors T1 and T2.

5 Technical Support

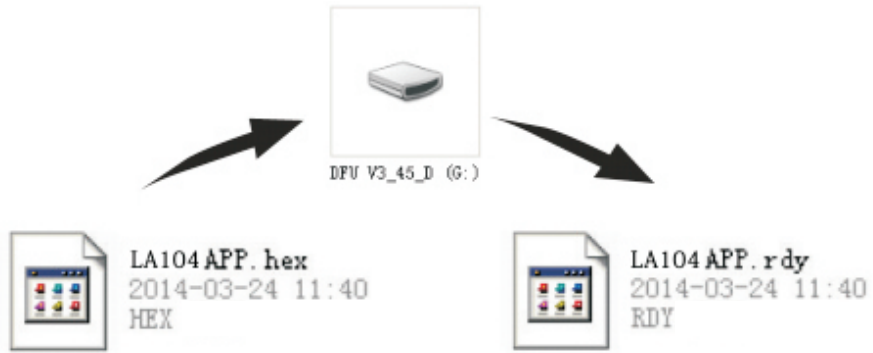
1. Firmware Update

1.Visit www.minidso.com to download the latest firmware of your logic analyzer to your PC.

2.Long press both LA104's power button and SMPL button to enter DFU firmware upgrade mode.

3.Use Micro USB data cord to connect LA104 to your PC, and a removable hard disk named “DFU Vx_xx_x” will appear on your PC. Copy the .hex firmware to the root directory of that disk. After the extension of the firmware changes from “.hex” to “.rdy”, restart LA104, thus the firmware is upgraded.

For more information, please visit www.minidso.com.



6 Legal Statements

This device fulfills part 15 of the FCC regulations Device must fulfill below 2 conditions:

(1) Device must not generate interference;

(2) Device must be able to resist any interferences on it, including interferences that could cause dangerous manipulation.

This is a trademark of Europe Union

This product with CE logo on it fulfills related Euro Union laws and regulations

Do not dispose this product with domestic waste.

Handling and recycle:Disposal of the product shall be manipulated according to laws and regulations in yourarea.