



孕龍科技股份有限公司
Zeroplus Technology Co., Ltd.

SPECIFICATION

MODEL: B08019-LAP-ARITHMETICAL LOGIC-M

PART NO: _____

VERSION: V1.51

Approver		Check	Design
GM	PM		

Customer Confirm

*Please fax the file to Zeroplus Technology after signing.

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1 Software Download

Please install the software as the following steps:

Remark: We won't have additional notice for you, when there is any modification of the module specification. If there is some unconformity caused by the module version upgrade, users should take the module software as the standard.

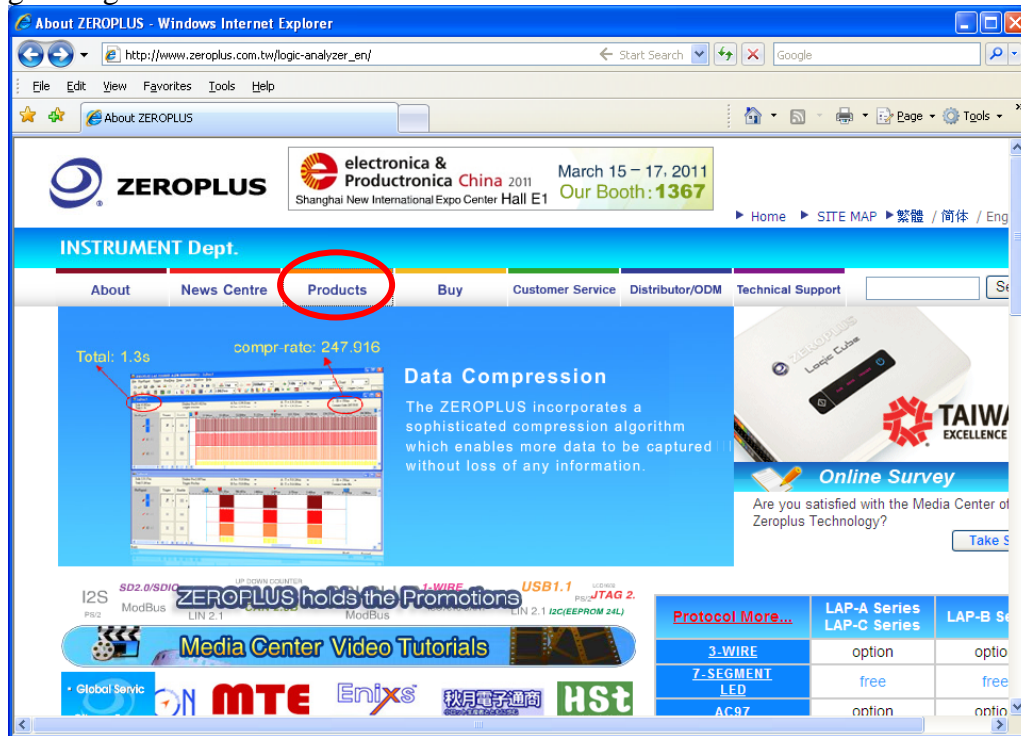
STEP 1. Visit the website of ZeroPlus: <http://www.zeroplus.com.tw>.

STEP 2. Click the **English** in the Instrument Division part on the Homepage.

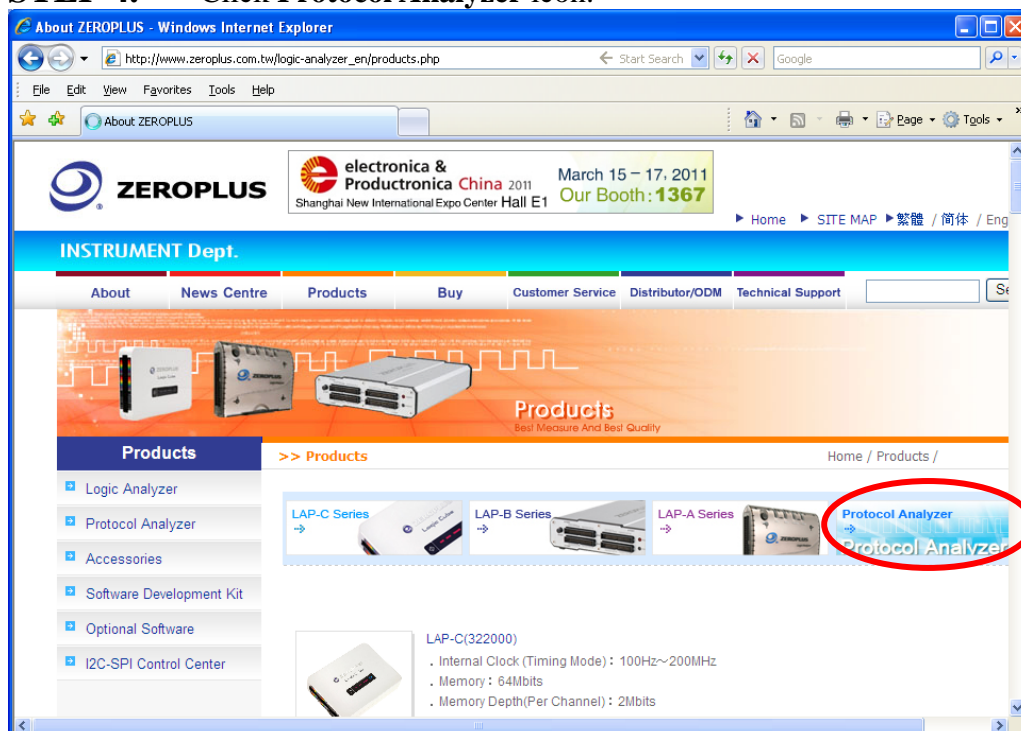




STEP 3. Click **Products** menu or select **Protocol Analyzer** item from its pull-down menu to go straight to STEP 5.

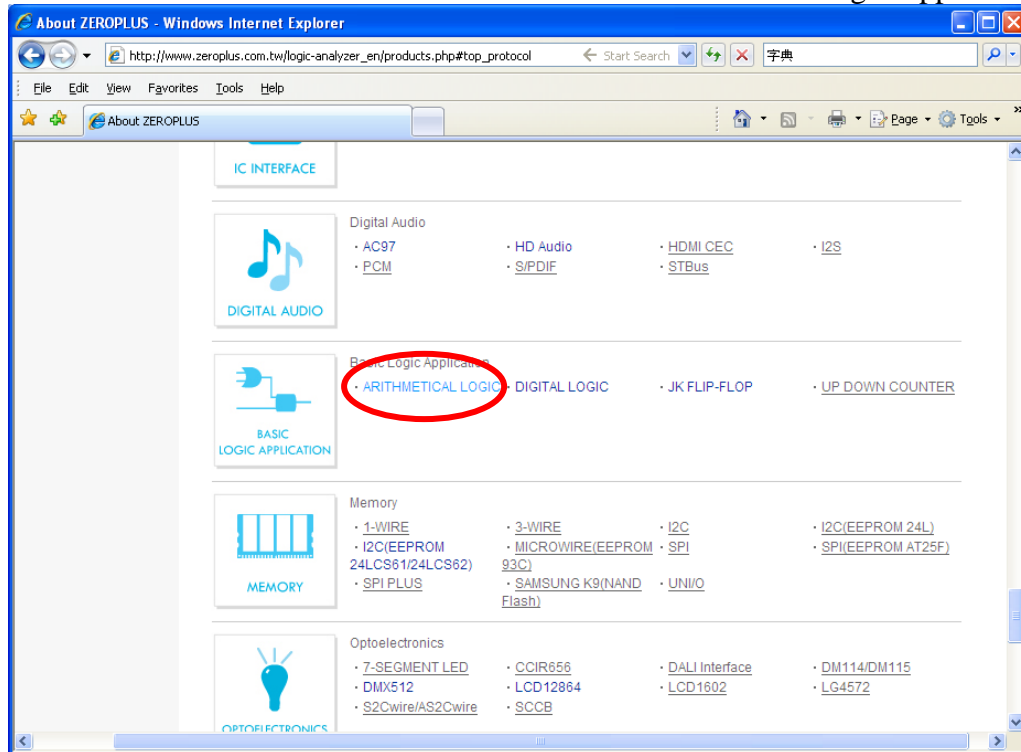


STEP 4. Click **Protocol Analyzer** icon.

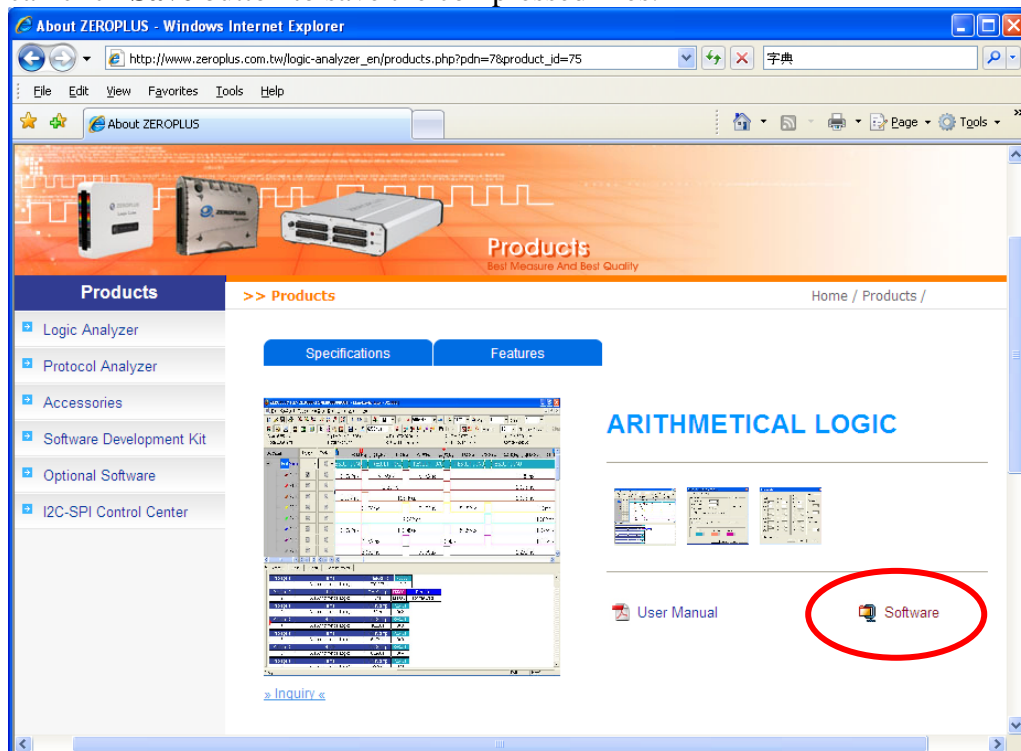




STEP 5. Click **ARITHMETICAL LOGIC** in the Basic Logic Application.

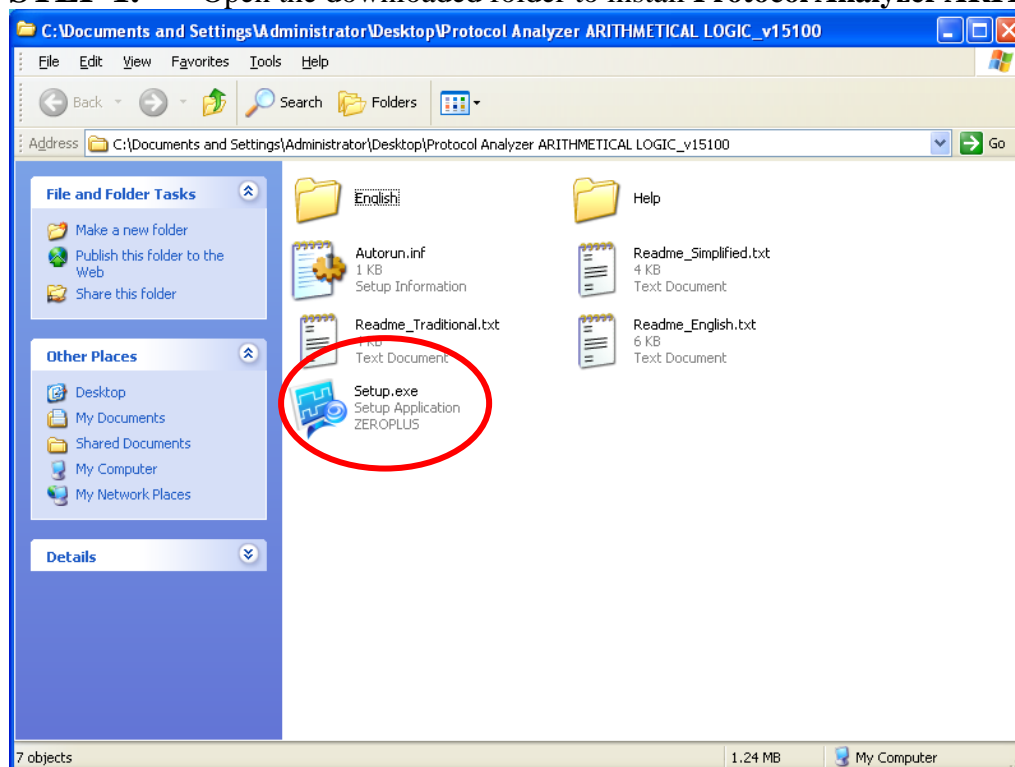


STEP 6. Click **Software** in the Products page. When the File Download dialog box appears, you can click **Save** button to save the compressed files.

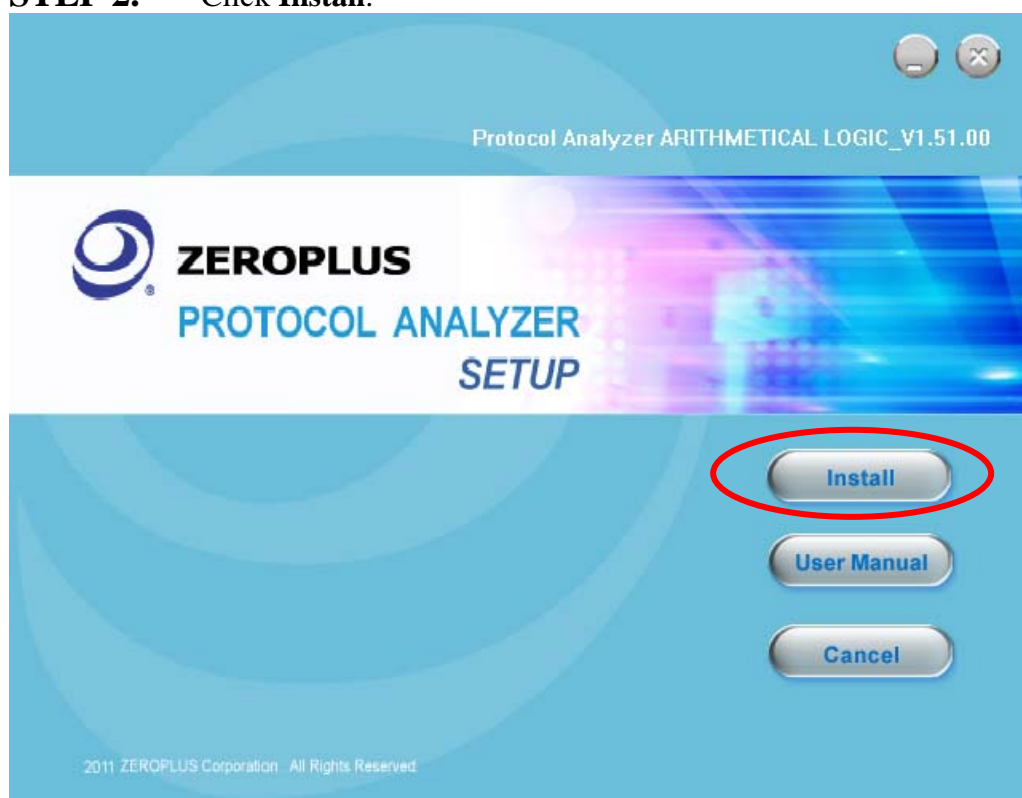


2 Software Installation

STEP 1. Open the downloaded folder to install **Protocol Analyzer ARITHMETICAL LOGIC**.

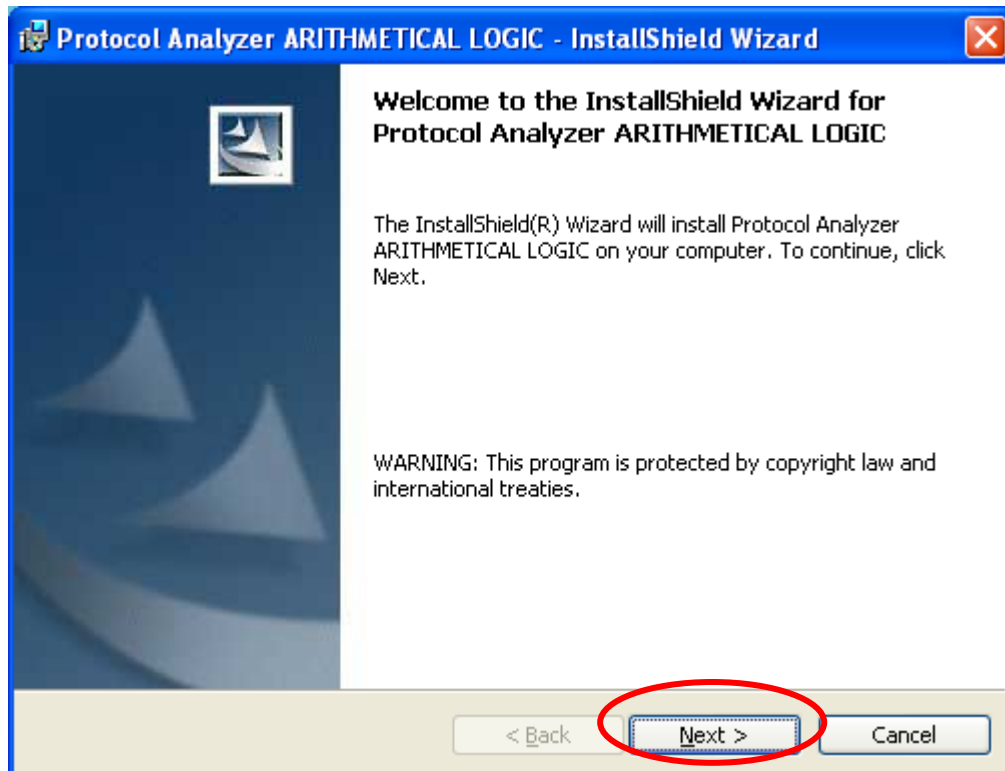


STEP 2. Click **Install**.

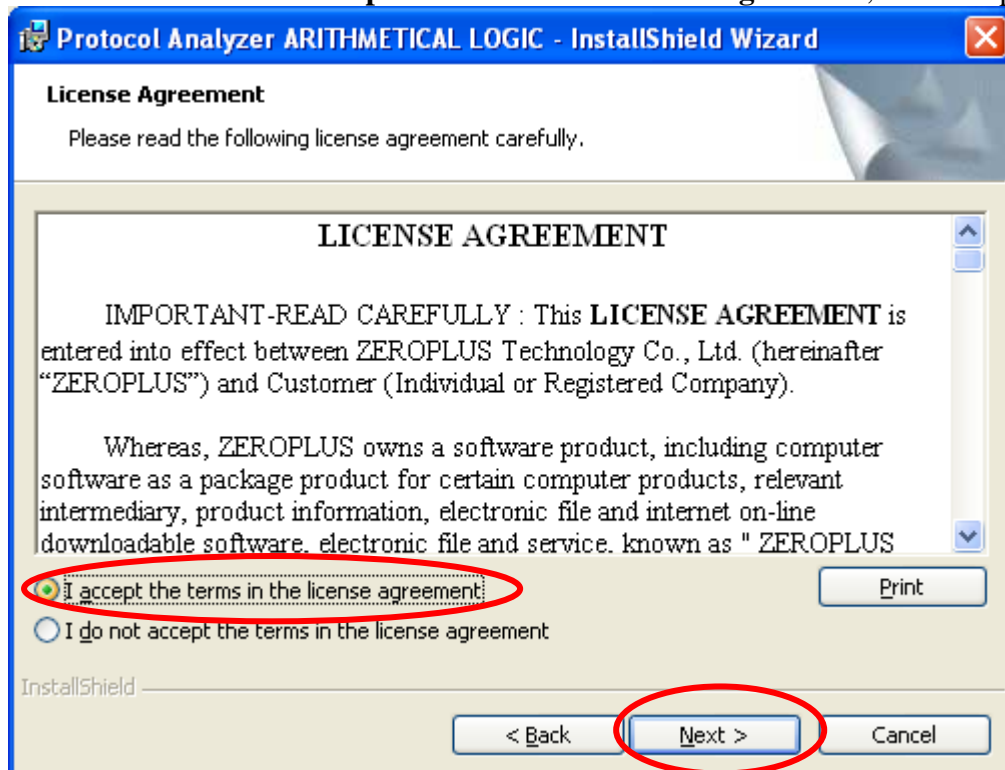




STEP 3. Click Next.



STEP 4. Select **I accept the terms in the license agreement**, and then press Next.





STEP 5. Fill in users' information in the below dialog box and click **Next**.

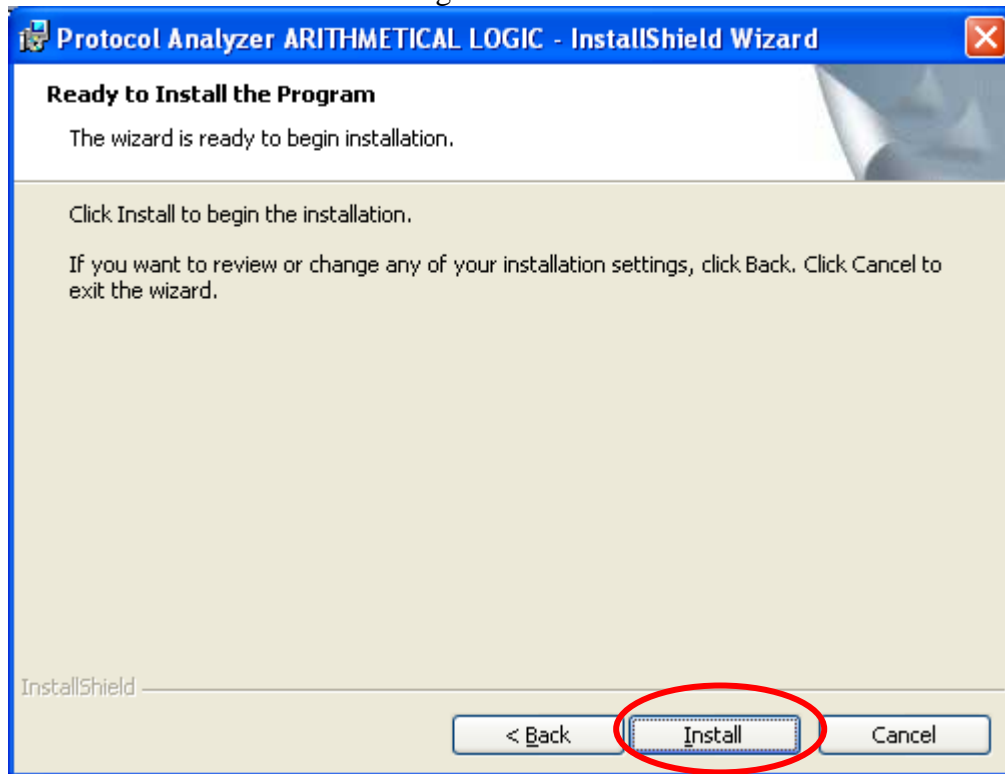
The dialog box is titled "Protocol Analyzer ARITHMETICAL LOGIC - InstallShield Wizard". It has a "Customer Information" section with the instruction "Please enter your information." Below this are two text input fields: "User Name:" containing "Microsoft" and "Organization:" containing "User". There is a section "Install this application for:" with two radio button options: "Anyone who uses this computer (all users)" (selected) and "Only for me (Microsoft)". At the bottom, there are three buttons: "< Back", "Next >" (circled in red), and "Cancel". The "InstallShield" logo is visible in the bottom left corner.

STEP 6. Select **Complete** and then click **Next**.

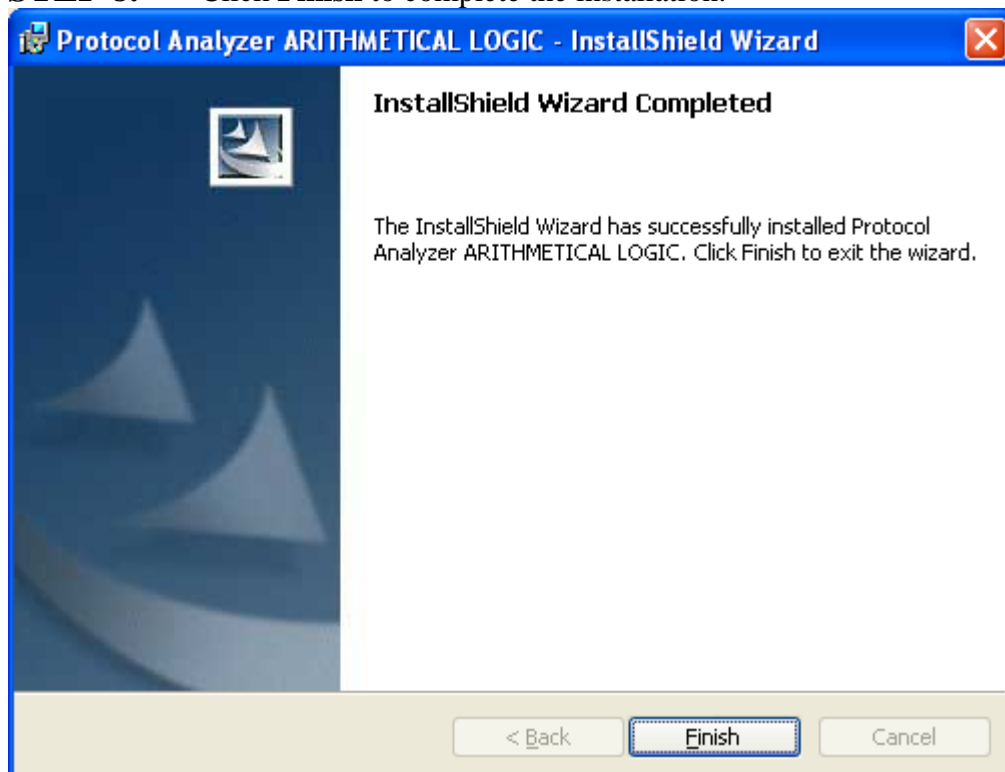
The dialog box is titled "Protocol Analyzer ARITHMETICAL LOGIC - InstallShield Wizard". It has a "Setup Type" section with the instruction "Choose the setup type that best suits your needs." Below this is the text "Please select a setup type." There are two radio button options: "Complete" (selected) and "Custom". The "Complete" option has a description: "All program features will be installed. (Requires the most disk space.)" and is accompanied by an icon of a computer with a checkmark. The "Custom" option has a description: "Choose which program features you want installed and where they will be installed. Recommended for advanced users." and is accompanied by an icon of a computer with a question mark. At the bottom, there are three buttons: "< Back", "Next >" (circled in red), and "Cancel". The "InstallShield" logo is visible in the bottom left corner.



STEP 7. Click **Install** to begin the installation.



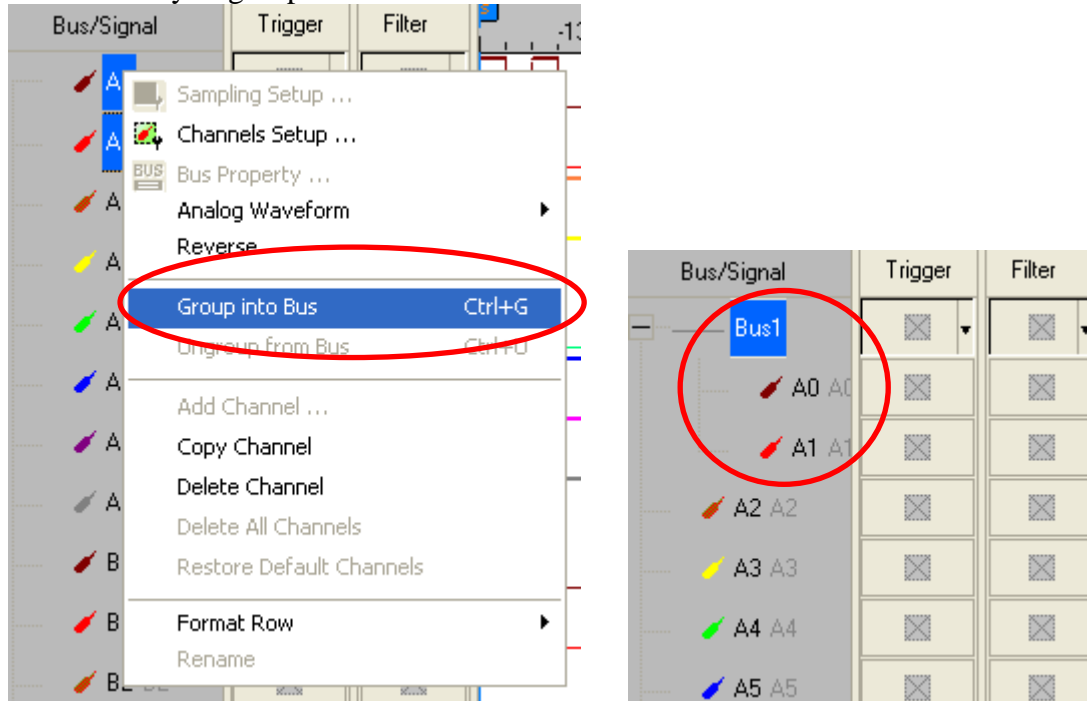
STEP 8. Click **Finish** to complete the installation.



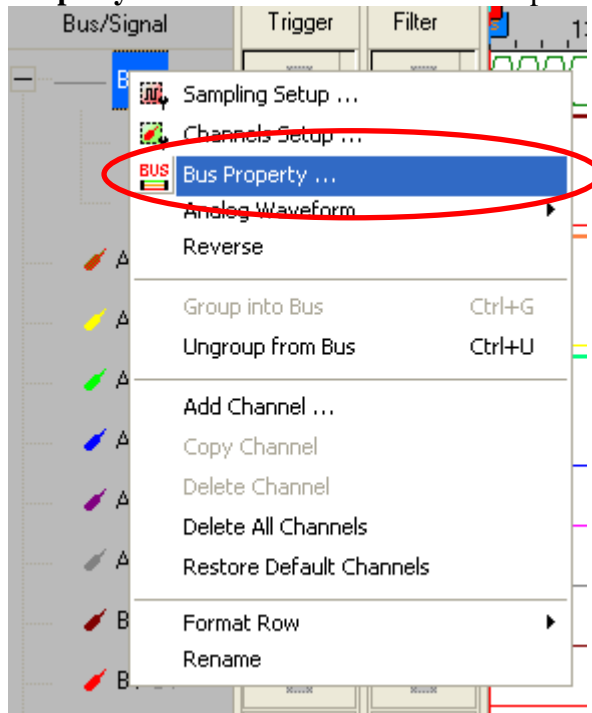


3 Software Register

STEP 1. Open the Logic Analyzer and group the unanalyzed channels into **Bus1** by pressing the **Right Key** on the mouse. **ARITHMETICAL LOGIC** needs two or more channels to decode signals, so it is necessary to group two or more channels into a Bus.

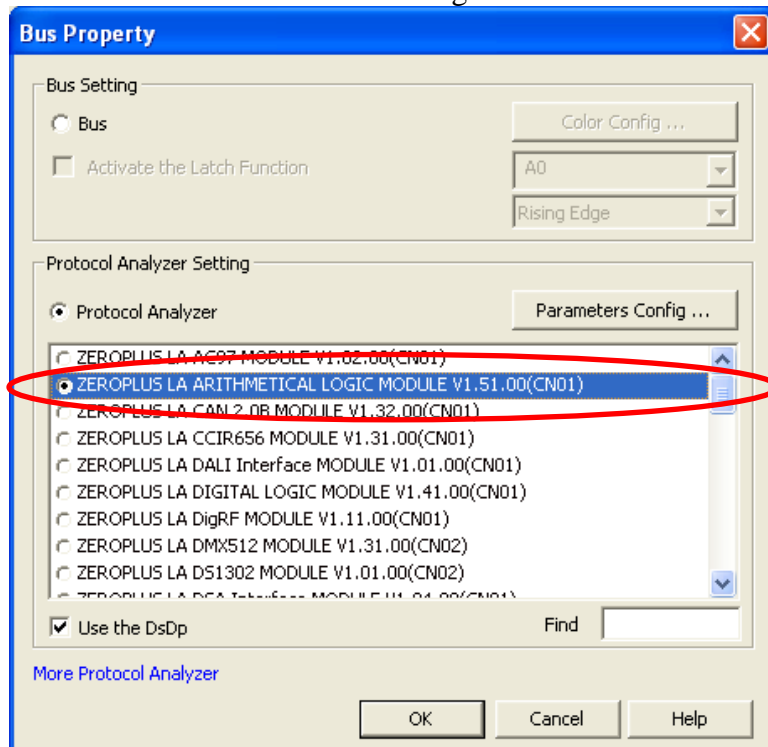


STEP 2. Select **Bus1**, and press **Right Key** on the mouse to list the menu, then press **Bus Property** or **Bus** icon on the toolbar to open **Bus Property** dialog box.

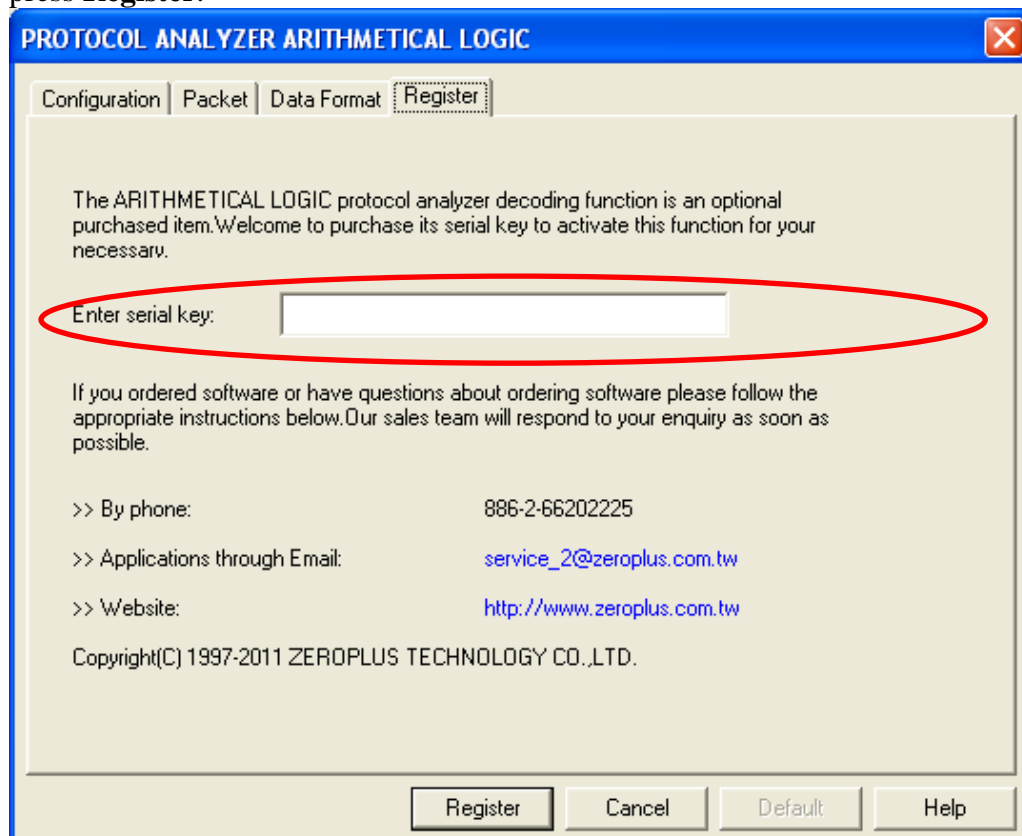




STEP 3. For Protocol Analyzer **ARITHMETICAL LOGIC** Parameters Configuration, select Protocol Analyzer, and then choose **ZEROPLUS LA ARITHMETICAL LOGIC MODULE V1.51.00(CN01)**. Next click **Parameters Configuration** to open the **PROTOCOL ANALYZER ARITHMETICAL LOGIC** dialog box.

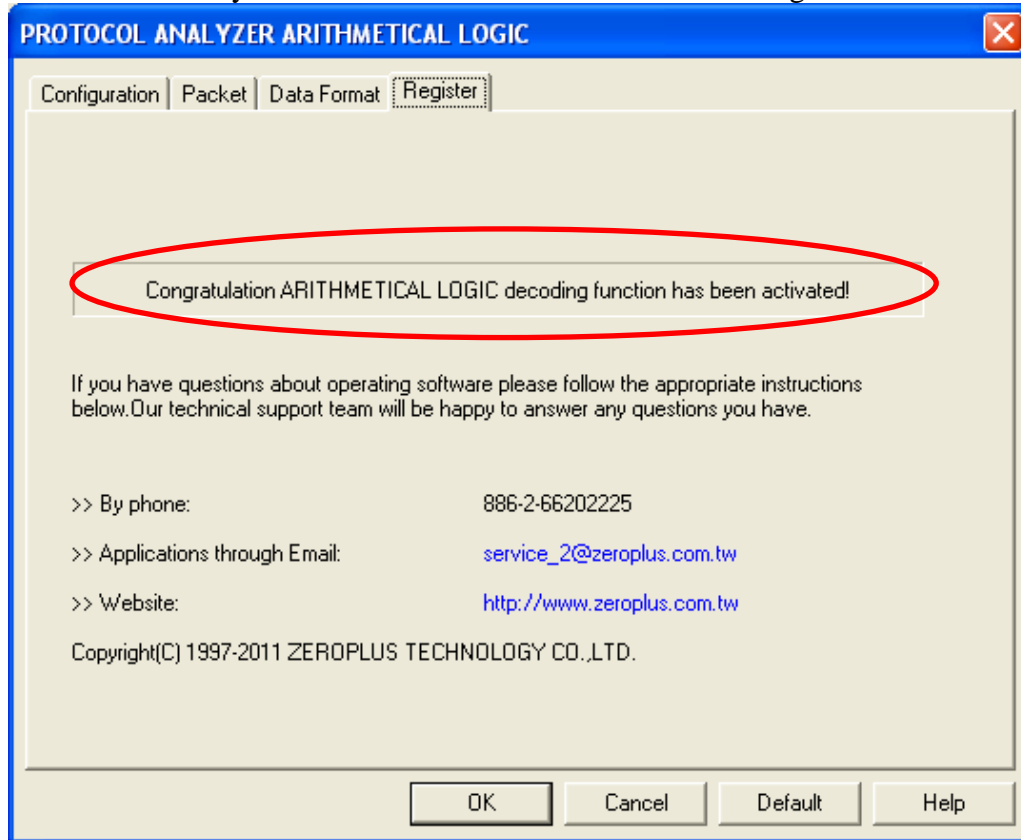


STEP 4. Press the Register tab to enter the serial key of the **ARITHMETICAL LOGIC**. Then, press **Register**.





STEP 5. After pressing the Register button, the following dialog box will appear; it denotes that the Protocol Analyzer ARITHMETICAL LOGIC has been registered successfully.





4 User Interface

Please refer to the below images to select options of setting **ARITHMETICAL LOGIC** module.

ARITHMETICAL LOGIC Configuration Dialog Box

PROTOCOL ANALYZER ARITHMETICAL LOGIC

Configuration | Packet | Data Format | Register

Function Operation

Device Selection: Adder

Operation Mode: Binary

Operation Formula: $A(n) + B(n) + C(in) = Y(n) + C(out) * 2^n$

Pin Assignment

Settings...

Protocol Analyzer Property

☐ Output Delay 50 ns
(Min:0,Max:1000)

Protocol Analyzer Color

Result Remainder Error

OK Cancel Default Help

Pin Assignment: Adder

Pin Assignment(Adder)

Augend A(n)

A(0): A0
A(1): A1
A(2): B0
A(3): B1
A(4): B6
A(5): B7
A(6): C0
A(7): C1

Addend B(n)

B(0): A2
B(1): A3
B(2): B2
B(3): B3
B(4): C2
B(5): C3
B(6): C4
B(7): C5

Sum S(n)

S(0): A4
S(1): A5
S(2): B4
S(3): B5
S(4): C6
S(5): C7
S(6): D0
S(7): D1

Carry-in Bit C(in)

☒ Channel A6
☐ Fixed Value 0

Carry-out Bit C(out)

☒ Activate A7

☐ Virtual output decoding mode

Operation Bit Width(n): 4

OK Cancel Default



Pin Assignment: Subtractor

Pin Assignment(Subtractor)

Minuend A(n)		Subtrahend B(n)		Difference D(n)		Borrow Input C(in)	
A(0):	A0	B(0):	A2	D(0):	A4	Channel	A6
A(1):	A1	B(1):	A3	D(1):	A5	Fixed Value	0
A(2):	B0	B(2):	B2	D(2):	B4	Borrow Output C(out) <input checked="" type="checkbox"/> Activate A7	
A(3):	B1	B(3):	B3	D(3):	B5		
A(4):	B6	B(4):	C2	D(4):	C6		
A(5):	B7	B(5):	C3	D(5):	C7		
A(6):	C0	B(6):	C4	D(6):	D0		
A(7):	C1	B(7):	C5	D(7):	D1		

☐ Virtual output decoding mode
Operation Bit Width(n): 2

OK Cancel Default

Pin Assignment: Multiplier

Pin Assignment(Multiplier)

Multiplicand A(n)		Multiplier B(n)		Product C(2n)			
A(0):	A0	B(0):	A2	C(0):	A4	C(8):	D0
A(1):	A1	B(1):	A3	C(1):	A5	C(9):	D1
A(2):	B0	B(2):	B2	C(2):	A6	C(10):	D2
A(3):	B1	B(3):	B3	C(3):	A7	C(11):	D3
A(4):	C0	B(4):	C4	C(4):	B4	C(12):	D4
A(5):	C1	B(5):	C5	C(5):	B5	C(13):	NO CH#
A(6):	C2	B(6):	C6	C(6):	B6	C(14):	NO CH#
A(7):	C3	B(7):	C7	C(7):	B7	C(15):	NO CH#

☐ Virtual output decoding mode
Operation Bit Width(n): 2

OK Cancel Default



Pin Assignment: Divider

Pin Assignment(Divider)

Dividend A(n)		Divisor B(n)		Quotient Q(n)		Remainder R(n)		Output Select
A(0):	A0	B(0):	A2	Q(0):	A4	R(0):	A6	
A(1):	A1	B(1):	A3	Q(1):	A5	R(1):	A7	
A(2):	B0	B(2):	B2	Q(2):	B4	R(2):	B6	
A(3):	B1	B(3):	B3	Q(3):	B5	R(3):	B7	
A(4):	C0	B(4):	C4	Q(4):	D0	R(4):	D4	
A(5):	C1	B(5):	C5	Q(5):	D1	R(5):	NO CHA	
A(6):	C2	B(6):	C6	Q(6):	D2	R(6):	NO CHA	
A(7):	C3	B(7):	C7	Q(7):	D3	R(7):	NO CHA	

☐ Virtual output decoding mode Operation Bit Width(n): 2 **OK** Cancel Default

Pin Assignment: Full Adder

Pin Assignment(Full Adder)

Augend A(n)		Addend B(n)		Sum S(n)		Carry-in Bit C(in)		Carry-out Bit C(out)
A(0):	A0	B(0):	A1	S(0):	A2	<input checked="" type="radio"/> Channel	A3	
A(1):	NO CHA	B(1):	NO CHA	S(1):	NO CHA	<input type="radio"/> Fixed Value	0	
A(2):	NO CHA	B(2):	NO CHA	S(2):	NO CHA			
A(3):	NO CHA	B(3):	NO CHA	S(3):	NO CHA			
A(4):	NO CHA	B(4):	NO CHA	S(4):	NO CHA			
A(5):	NO CHA	B(5):	NO CHA	S(5):	NO CHA			
A(6):	NO CHA	B(6):	NO CHA	S(6):	NO CHA			
A(7):	NO CHA	B(7):	NO CHA	S(7):	NO CHA			

☐ Virtual output decoding mode Operation Bit Width(n): 2 **OK** Cancel Default

☒ Activate A4



Pin Assignment: Half Adder

Pin Assignment(Half Adder)

Augend A(n)		Addend B(n)		Sum S(n)		Carry-in Bit C(in)	
A(0):	A0	B(0):	A1	S(0):	A2	<input checked="" type="radio"/> Channel	NO CHA
A(1):	NO CHA	B(1):	NO CHA	S(1):	NO CHA	<input type="radio"/> Fixed Value	0
A(2):	NO CHA	B(2):	NO CHA	S(2):	NO CHA	Carry-out Bit C(out) <input checked="" type="checkbox"/> Activate A3	
A(3):	NO CHA	B(3):	NO CHA	S(3):	NO CHA		
A(4):	NO CHA	B(4):	NO CHA	S(4):	NO CHA		
A(5):	NO CHA	B(5):	NO CHA	S(5):	NO CHA		
A(6):	NO CHA	B(6):	NO CHA	S(6):	NO CHA		
A(7):	NO CHA	B(7):	NO CHA	S(7):	NO CHA		

☐ Virtual output decoding mode
Operation Bit Width(n): 2

OK Cancel Default

Pin Assignment: Full Subtractor

Pin Assignment(Full Subtractor)

Minuend A(n)		Subtrahend B(n)		Difference D(n)		Borrow Input C(in)	
A(0):	A0	B(0):	A1	D(0):	A2	<input checked="" type="radio"/> Channel	A3
A(1):	NO CHA	B(1):	NO CHA	D(1):	NO CHA	<input type="radio"/> Fixed Value	0
A(2):	NO CHA	B(2):	NO CHA	D(2):	NO CHA	Borrow Output C(out) <input checked="" type="checkbox"/> Activate A4	
A(3):	NO CHA	B(3):	NO CHA	D(3):	NO CHA		
A(4):	NO CHA	B(4):	NO CHA	D(4):	NO CHA		
A(5):	NO CHA	B(5):	NO CHA	D(5):	NO CHA		
A(6):	NO CHA	B(6):	NO CHA	D(6):	NO CHA		
A(7):	NO CHA	B(7):	NO CHA	D(7):	NO CHA		

☐ Virtual output decoding mode
Operation Bit Width(n): 2

OK Cancel Default



Pin Assignment: Half Subtractor

Function Operation:

Device Selection: Set the Operation to Adder, Subtractor, Multiplier, Divider, Full Adder, Half Adder, Full Subtractor or Half Subtractor.

Operation Mode: Set the Mode to Binary or BCD. Notice that the BCD mode is only available for the bit width which is not less than 4 bits.

Operation Formula: Use the formula from the Arithmetical True Table to calculate the corresponding values and add the Bit Width(n) Display.

Pin Assignment:

Press the **Settings** button to open the corresponding Pin Assignment dialog box.

When the Operation Bit Width(n) is 2 by default, it indicates that the Bit Width of each channel is 2 in the Adder; when the Operation Bit Width(n) is 4 or 8, it indicates that the Bit Width of each channel will be 4 or 8 and the Carry-in Bit is always one channel. The Channel Settings of the Subtractor are the same as that of the Adder, which are different from that of the Multiplier. As to the Multiplier, the Product is twice of the Devices, that is to say, when the Operation Bit Width(n) is 2, the Product will be four channels. As to the Divider, all the Channels Settings are the same, for example, the Bit Width of each channel is set to 2. When the Operation is Adder or Subtractor, the Carry-in Bit or Borrow Input may be the fixed value, 0 or 1, and the Decoding Calculation and the Decoding Display are unchanged at this time. But the Change is that the one channel of the Carry-in Bit or the Borrow Input will be reduced. However, it is unnecessary to consider the Carry-out Bit or the Borrow Output some time when the calculated Decoding Display is unchanged, and it is only unnecessary to contrast the Carry-in and the Borrow when do contrasting. No matter what statuses the Carry-in and the Borrow are, there is no need to judge as error. When the Virtual output decoding mode is enabled, the Output Channels will be in the disabled status.

Protocol Analyzer Property:

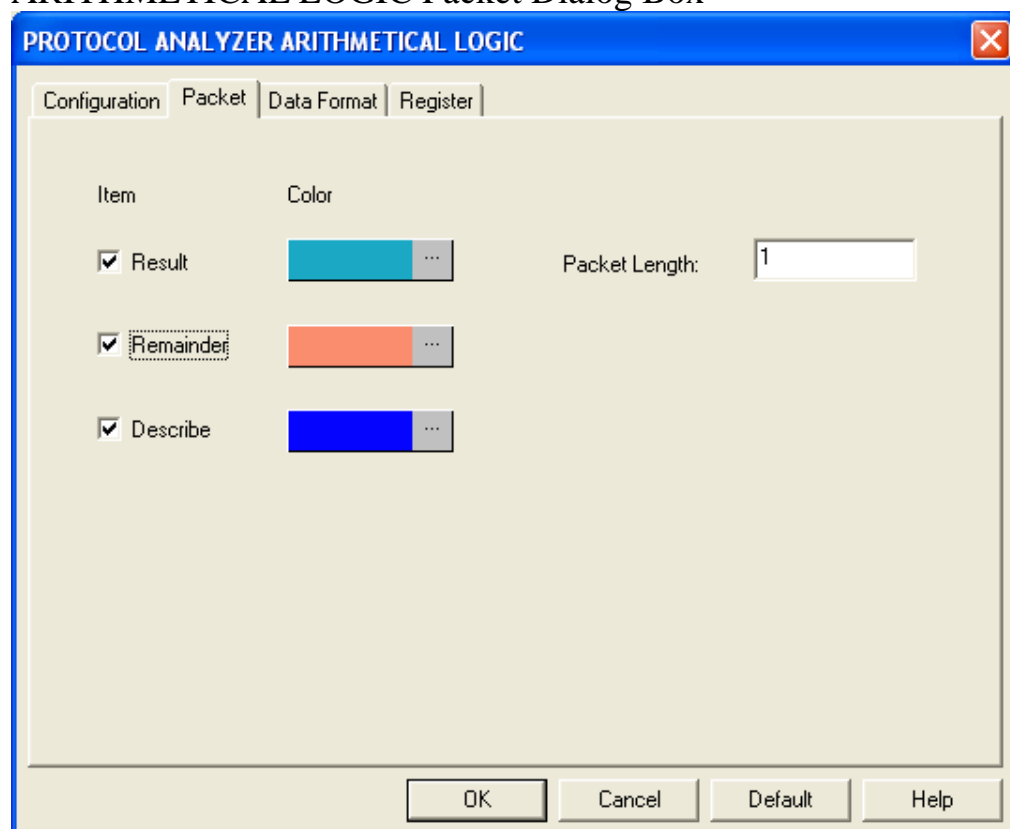
Output Delay: Set the Output Delay in the range from 0 to 1000ns, the default is 50ns.

Protocol Analyzer Color:

Users can vary the color of the items according to their own requirements.

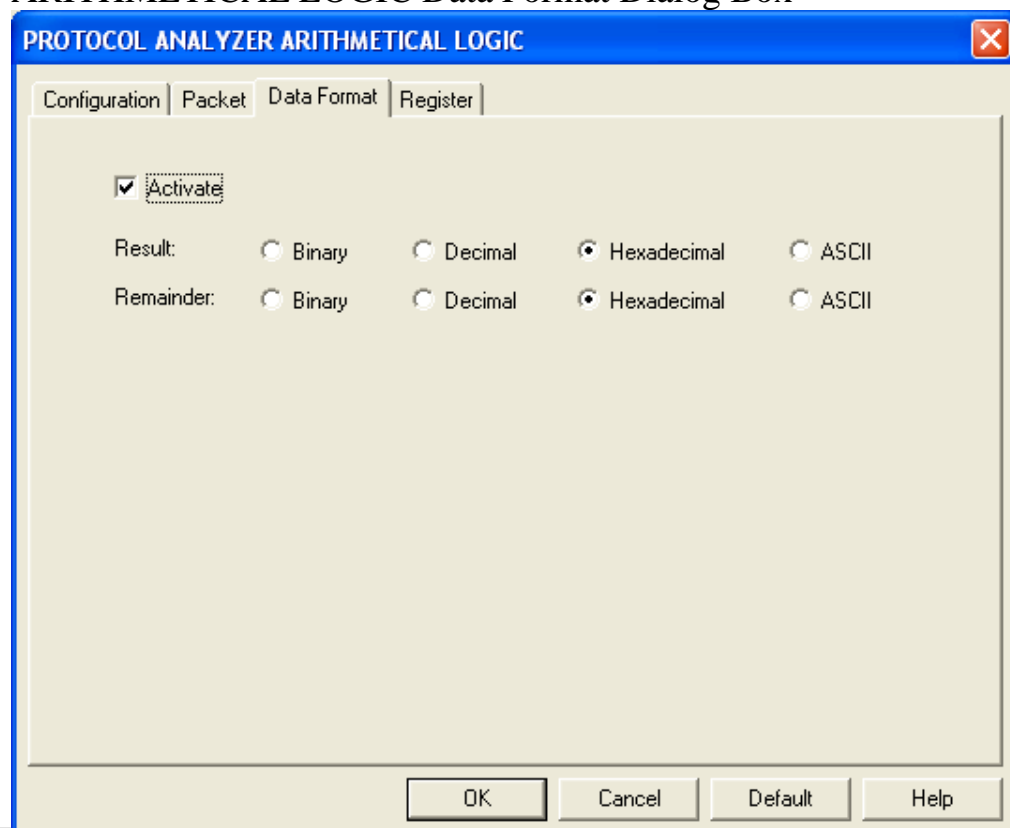


ARITHMETICAL LOGIC Packet Dialog Box



In the Packet dialog box, users can vary the color of items and set the item to be displayed.
Packet Length: Set the Length in the range from 1 to 1000.

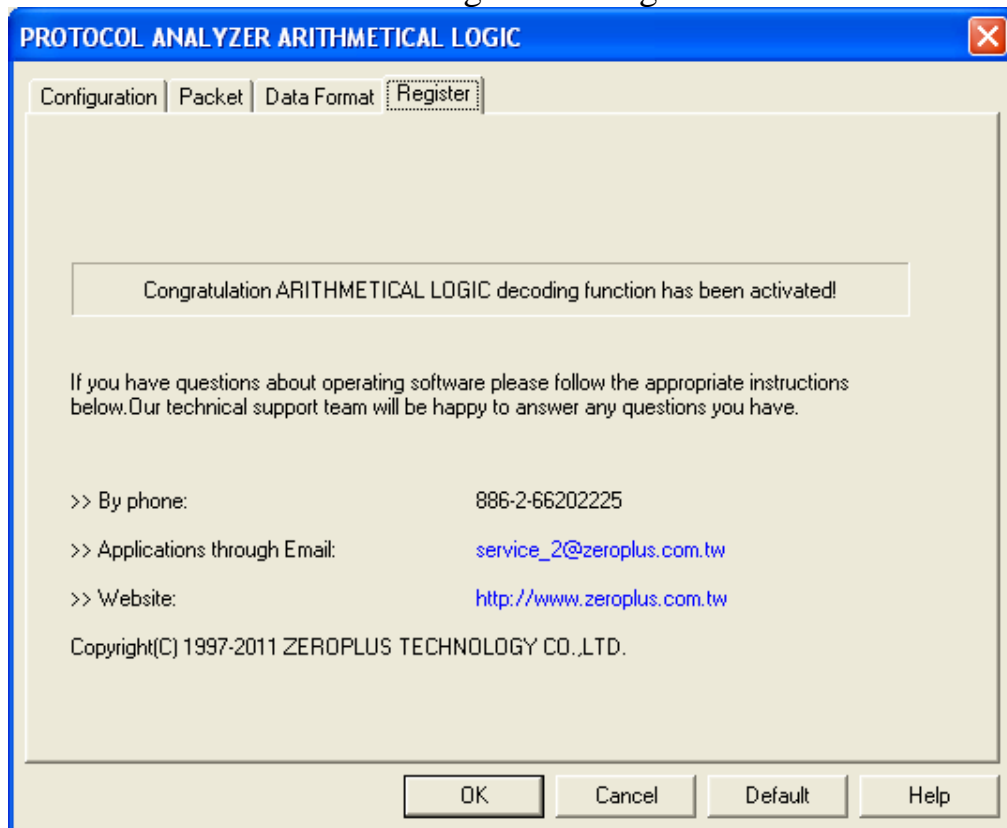
ARITHMETICAL LOGIC Data Format Dialog Box





Users can set the Data Format of the Result and the Remainder as their requirements. When selecting the option, Activate, the data format is decided by the settings in the Protocol Analyzer; when not selecting the option, Activate, the data format is decided by the settings in the main program.

ARITHMETICAL LOGIC Register Dialog Box

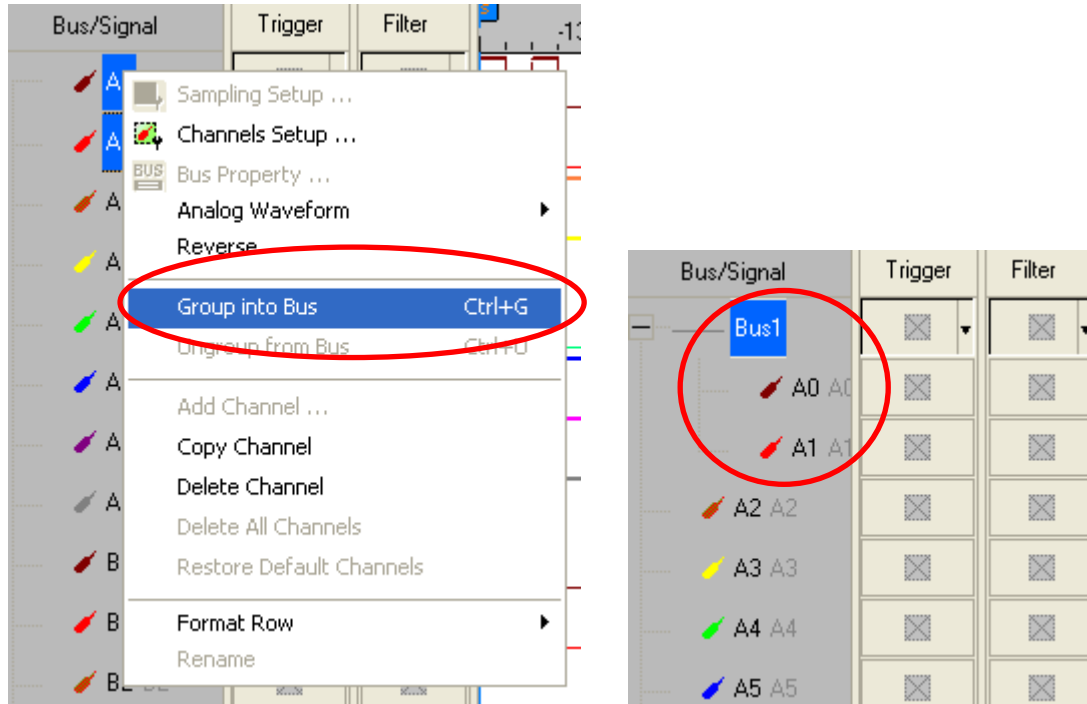


There is ZeroPlus company information. If you have any questions about software operations, you can contact ZeroPlus by Telephone or Email.

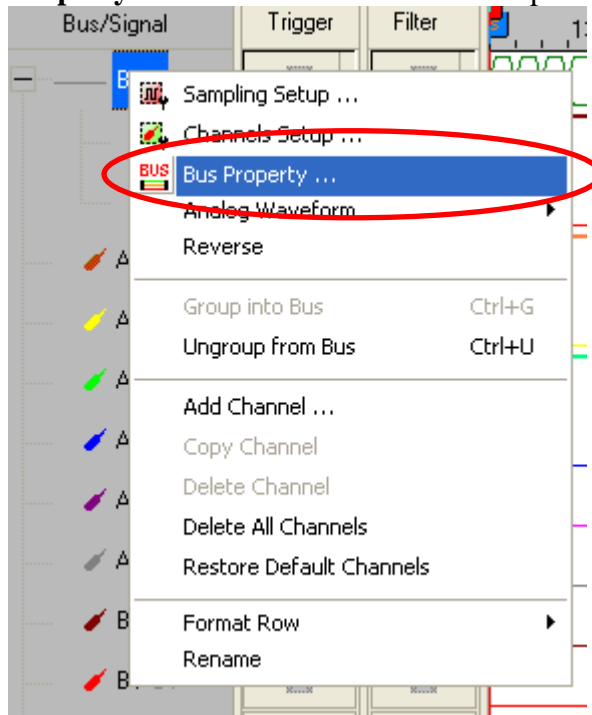


5 Operating Instructions

STEP 1. Group the unanalyzed channels into **Bus1** by pressing the **Right Key** on the mouse. **ARITHMETICAL LOGIC** needs two or more channels to decode signals, so it is necessary to group two or more channels into a Bus.

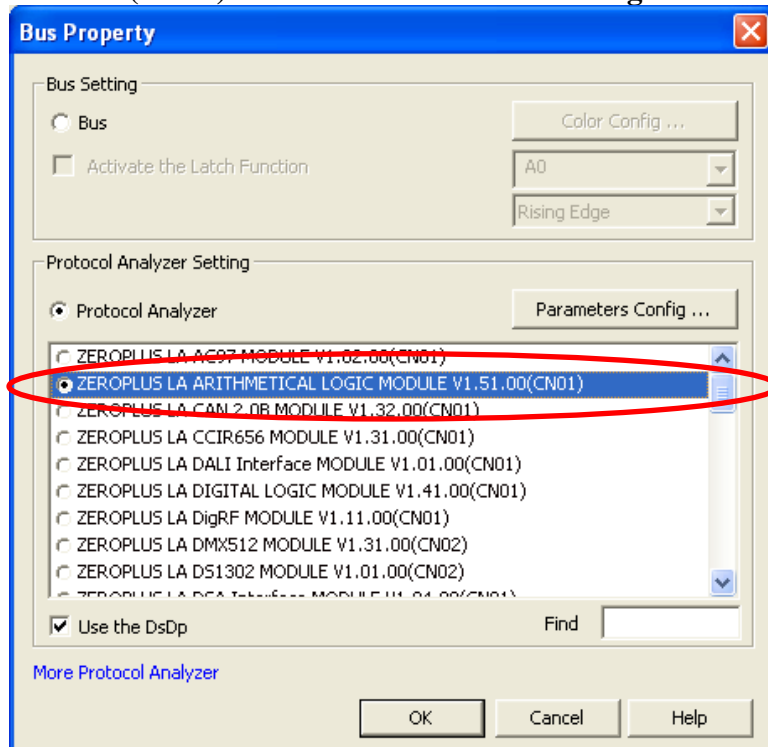


STEP 2. Select **Bus1**, and press **Right Key** on the mouse to list the menu, then press **Bus Property** or **Bus** icon on the toolbar to open **Bus Property** dialog box.

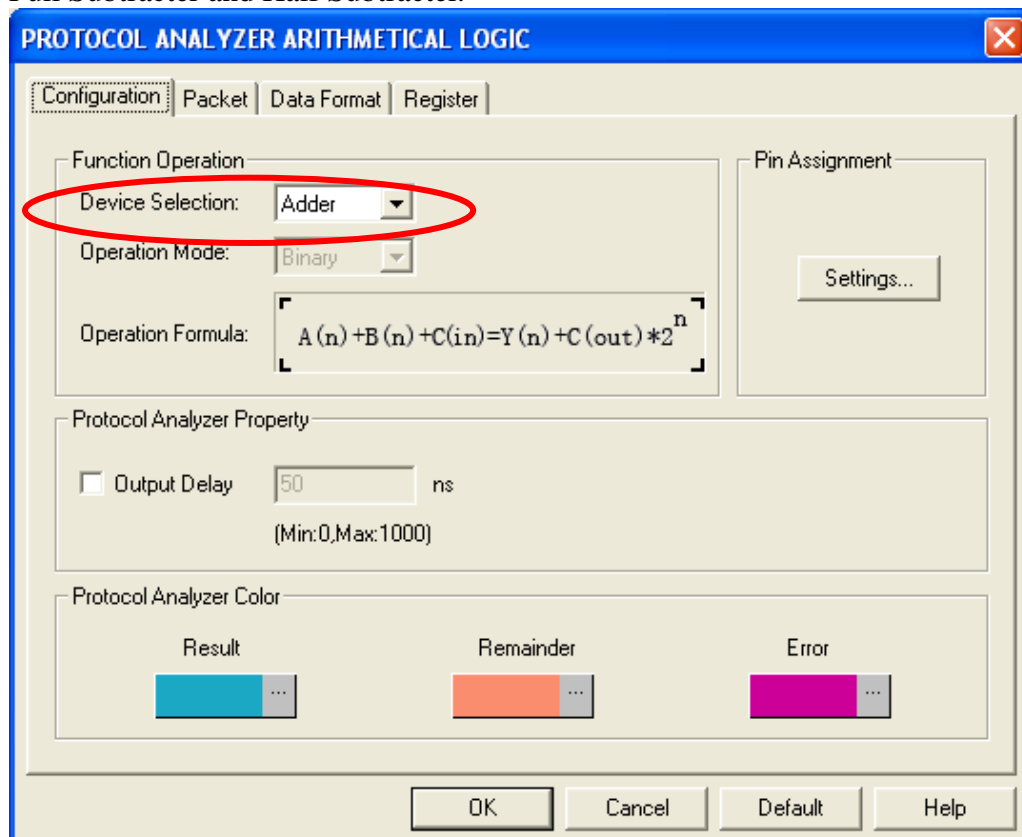




STEP 3. For Protocol Analyzer **ARITHMETICAL LOGIC** Parameters Configuration, select Protocol Analyzer, and then choose **ZEROPLUS LA ARITHMETICAL LOGIC MODULE V1.51.00(CN01)**. Next click **Parameters Configuration** to open the **Configuration** dialog box.

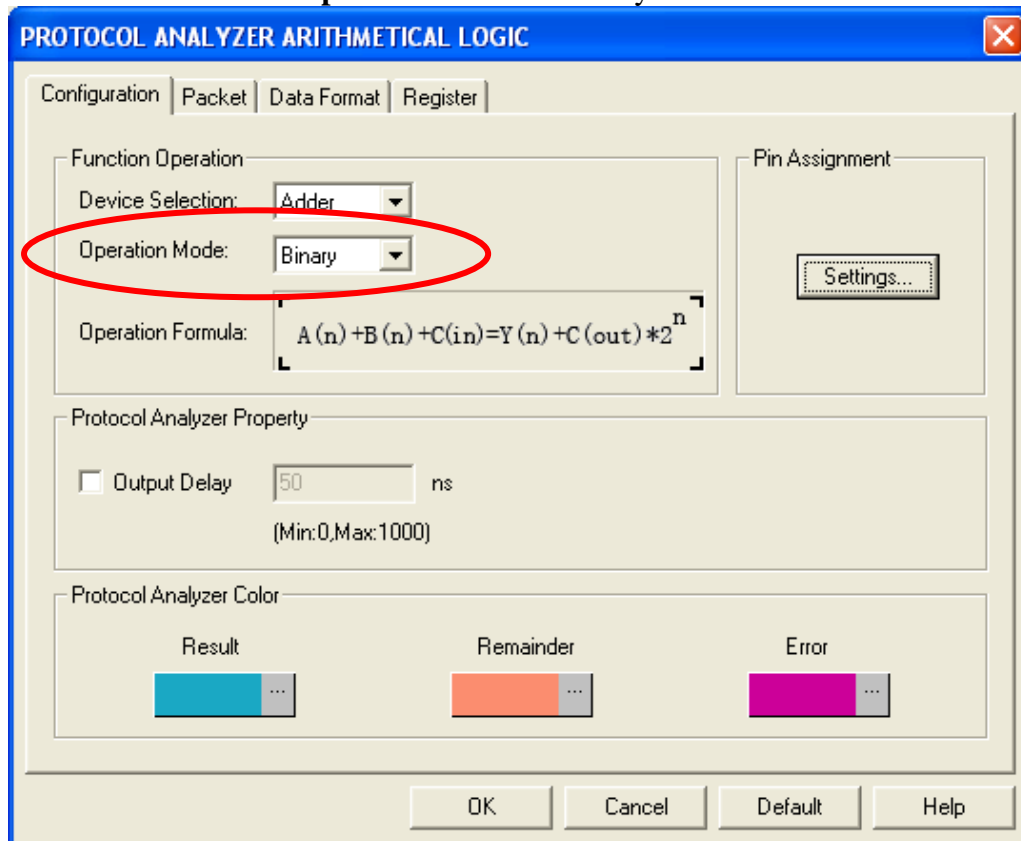


STEP 4. Set the **Device Selection** to Adder, Subtractor, Multiplier, Divider, Full Adder, Half Adder, Full Subtractor and Half Subtractor.

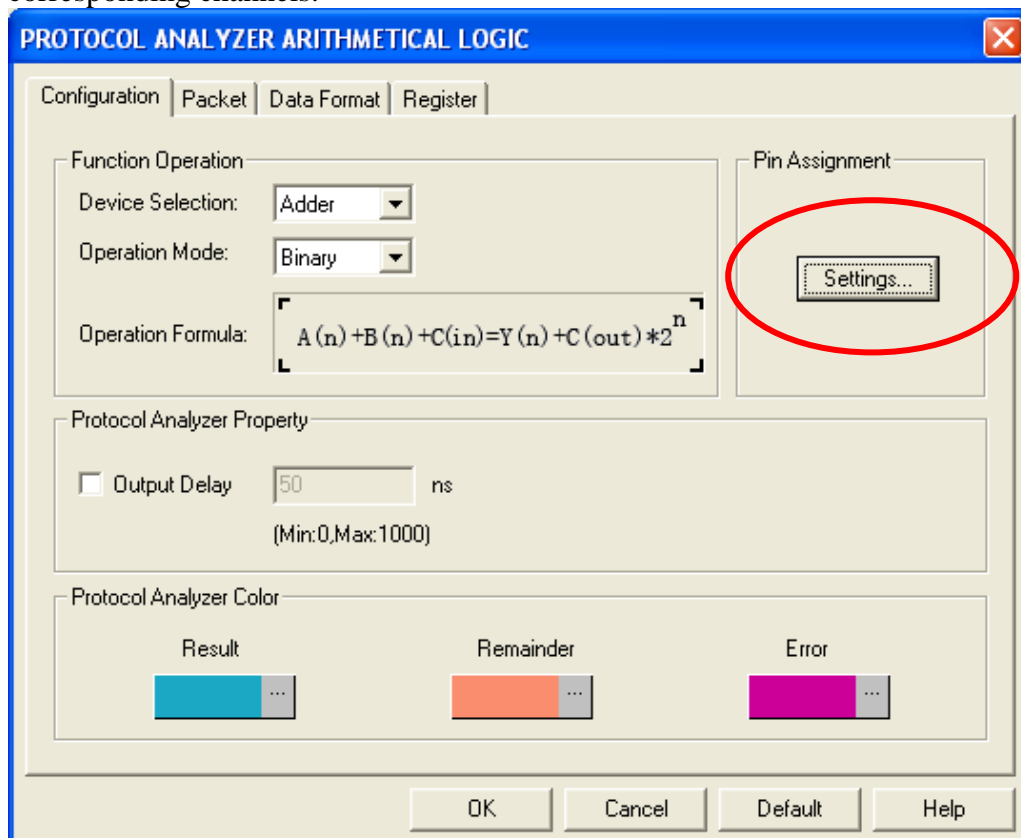




STEP 5. Set the **Operation Mode** to Binary or BCD.

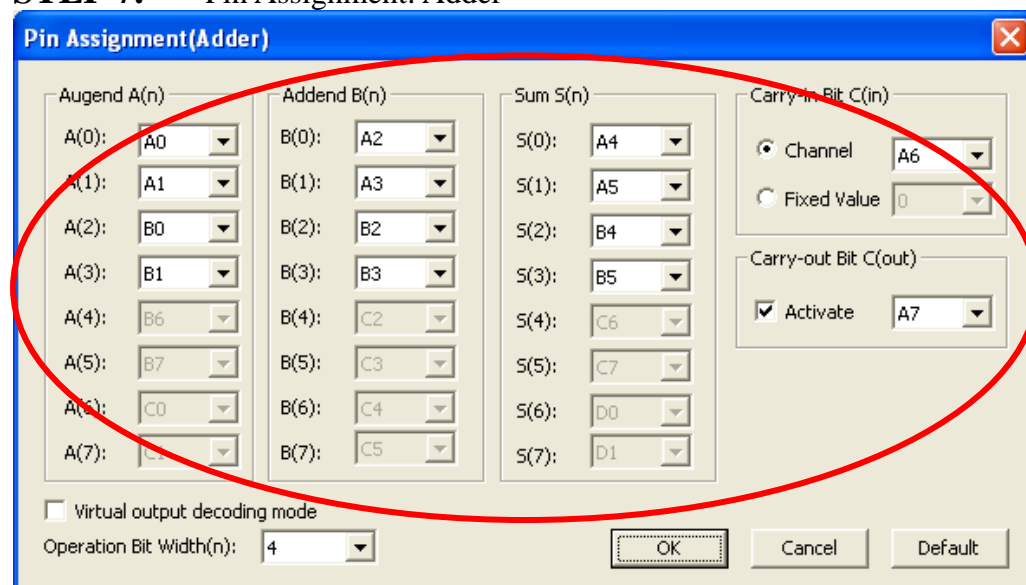


STEP 6. Press the **Settings** button to open the Pin Assignment dialog box and set the corresponding channels.





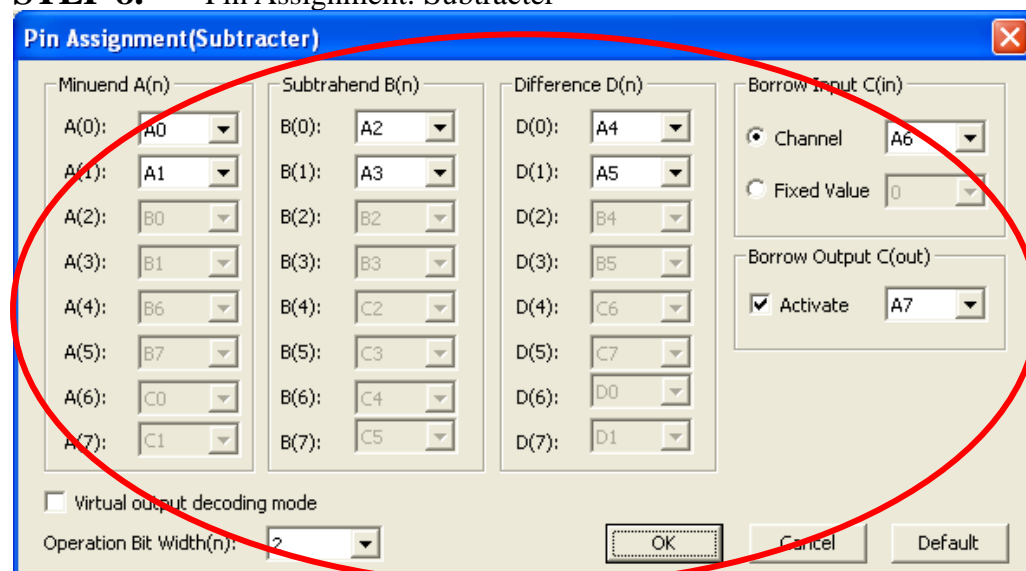
STEP 7. Pin Assignment: Adder



The Pin Assignment(Adder) dialog box is shown with a red oval highlighting the input and output pin assignments. The dialog includes the following sections:

- Augend A(n):** A(0) to A(7) with dropdowns for A0, A1, B0, B1, B6, B7, C0, C1.
- Addend B(n):** B(0) to B(7) with dropdowns for A2, A3, B2, B3, C2, C3, C4, C5.
- Sum S(n):** S(0) to S(7) with dropdowns for A4, A5, B4, B5, C6, C7, D0, D1.
- Carry-in Bit C(in):** Channel (selected) with dropdown A6, and Fixed Value 0.
- Carry-out Bit C(out):** Activate (checked) with dropdown A7.
- Virtual output decoding mode:** Unchecked.
- Operation Bit Width(n):** 4.
- Buttons:** OK, Cancel, Default.

STEP 8. Pin Assignment: Subtractor

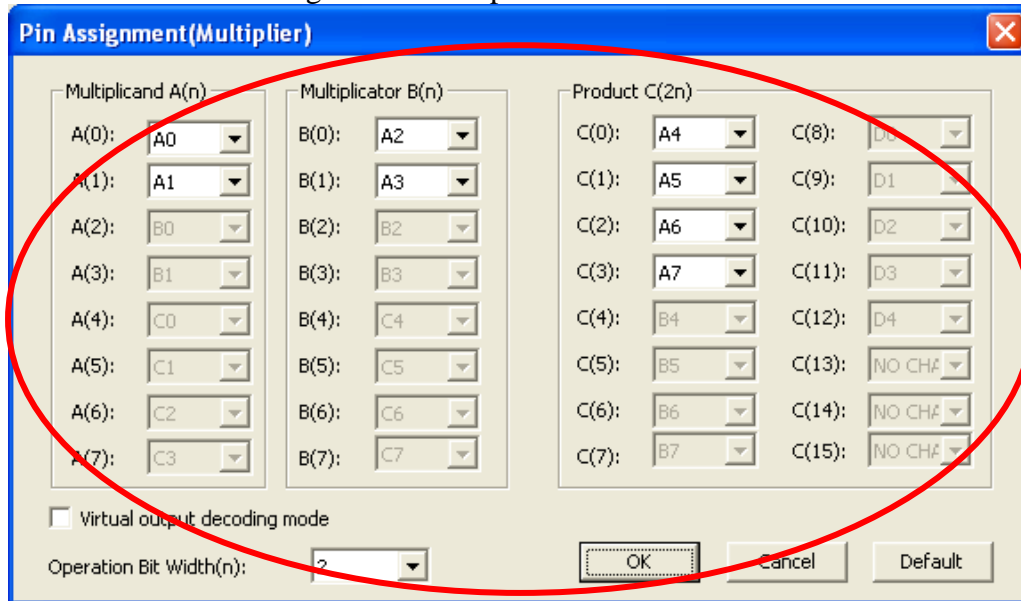


The Pin Assignment(Subtractor) dialog box is shown with a red oval highlighting the input and output pin assignments. The dialog includes the following sections:

- Minuend A(n):** A(0) to A(7) with dropdowns for A0, A1, B0, B1, B6, B7, C0, C1.
- Subtrahend B(n):** B(0) to B(7) with dropdowns for A2, A3, B2, B3, C2, C3, C4, C5.
- Difference D(n):** D(0) to D(7) with dropdowns for A4, A5, B4, B5, C6, C7, D0, D1.
- Borrow Input C(in):** Channel (selected) with dropdown A6, and Fixed Value 0.
- Borrow Output C(out):** Activate (checked) with dropdown A7.
- Virtual output decoding mode:** Unchecked.
- Operation Bit Width(n):** 2.
- Buttons:** OK, Cancel, Default.



STEP 9. Pin Assignment: Multiplier



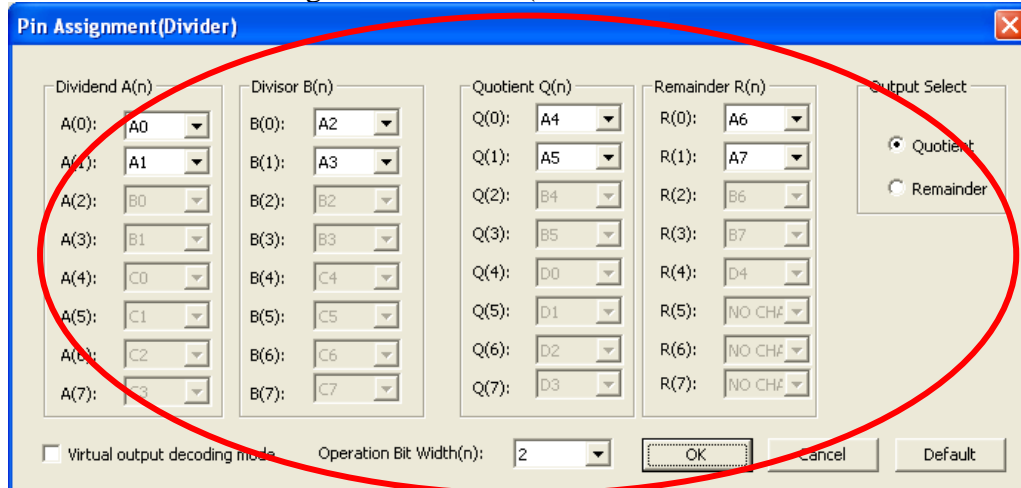
The dialog box titled "Pin Assignment(Multiplier)" contains three main sections for pin assignment:

- Multiplicand A(n):** A(0) to A(7) assigned to A0, A1, B0, B1, C0, C1, C2, C3.
- Multiplicator B(n):** B(0) to B(7) assigned to A2, A3, B2, B3, C4, C5, C6, C7.
- Product C(2n):** C(0) to C(15) assigned to A4, A5, A6, A7, B4, B5, B6, B7, D0, D1, D2, D3, D4, NO CHA, NO CHA, NO CHA.

Additional options include:

- ☐ Virtual output decoding mode
- Operation Bit Width(n): 2
- Buttons: OK, Cancel, Default

STEP 10. Pin Assignment: Divider (The other Devices can refer to the above operation.)



The dialog box titled "Pin Assignment(Divider)" contains four main sections for pin assignment:

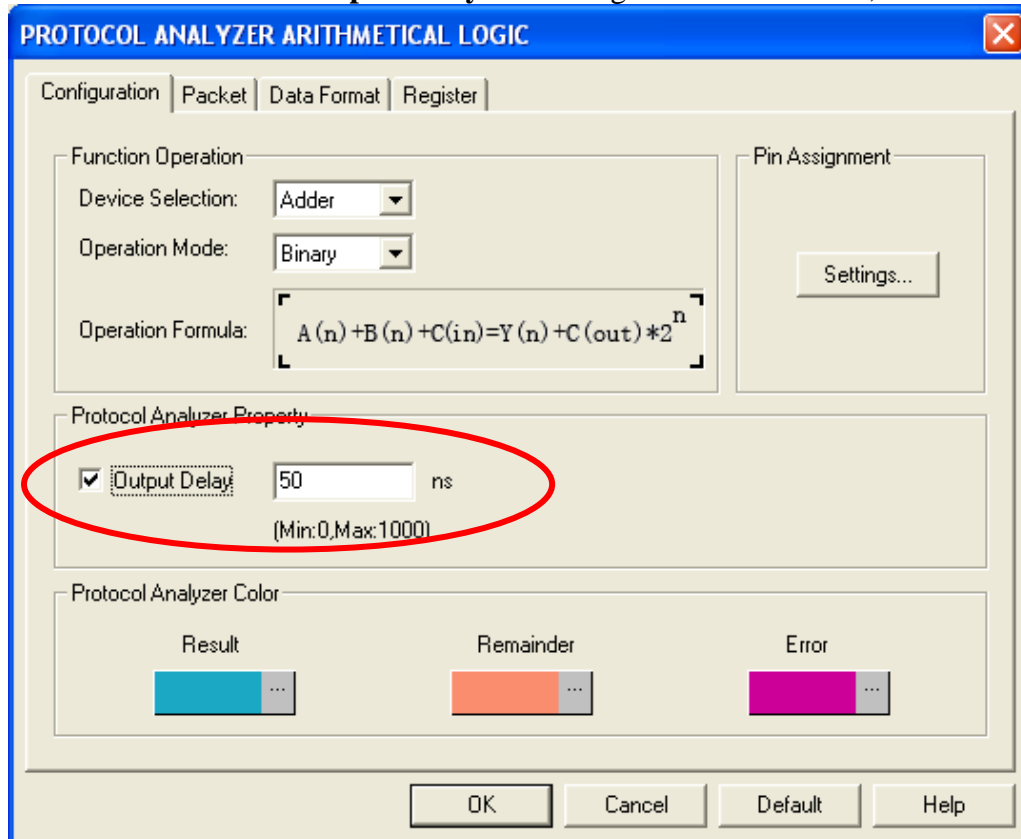
- Dividend A(n):** A(0) to A(7) assigned to A0, A1, B0, B1, C0, C1, C2, C3.
- Divisor B(n):** B(0) to B(7) assigned to A2, A3, B2, B3, C4, C5, C6, C7.
- Quotient Q(n):** Q(0) to Q(7) assigned to A4, A5, B4, B5, D0, D1, D2, D3.
- Remainder R(n):** R(0) to R(7) assigned to A6, A7, B6, B7, D4, NO CHA, NO CHA, NO CHA.

Additional options include:

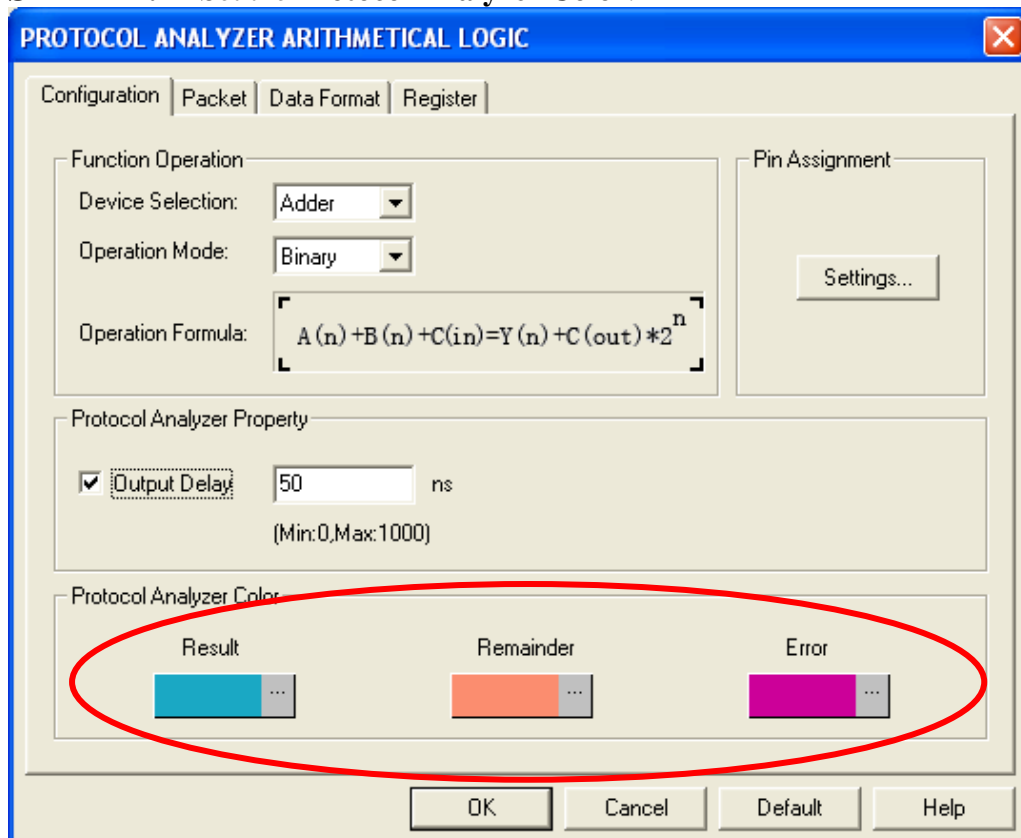
- ☐ Virtual output decoding mode
- Operation Bit Width(n): 2
- Output Select: ☒ Quotient, ☐ Remainder
- Buttons: OK, Cancel, Default



STEP 11. Set the **Output Delay** in the range from 0 to 1000ns, the default is 50ns.



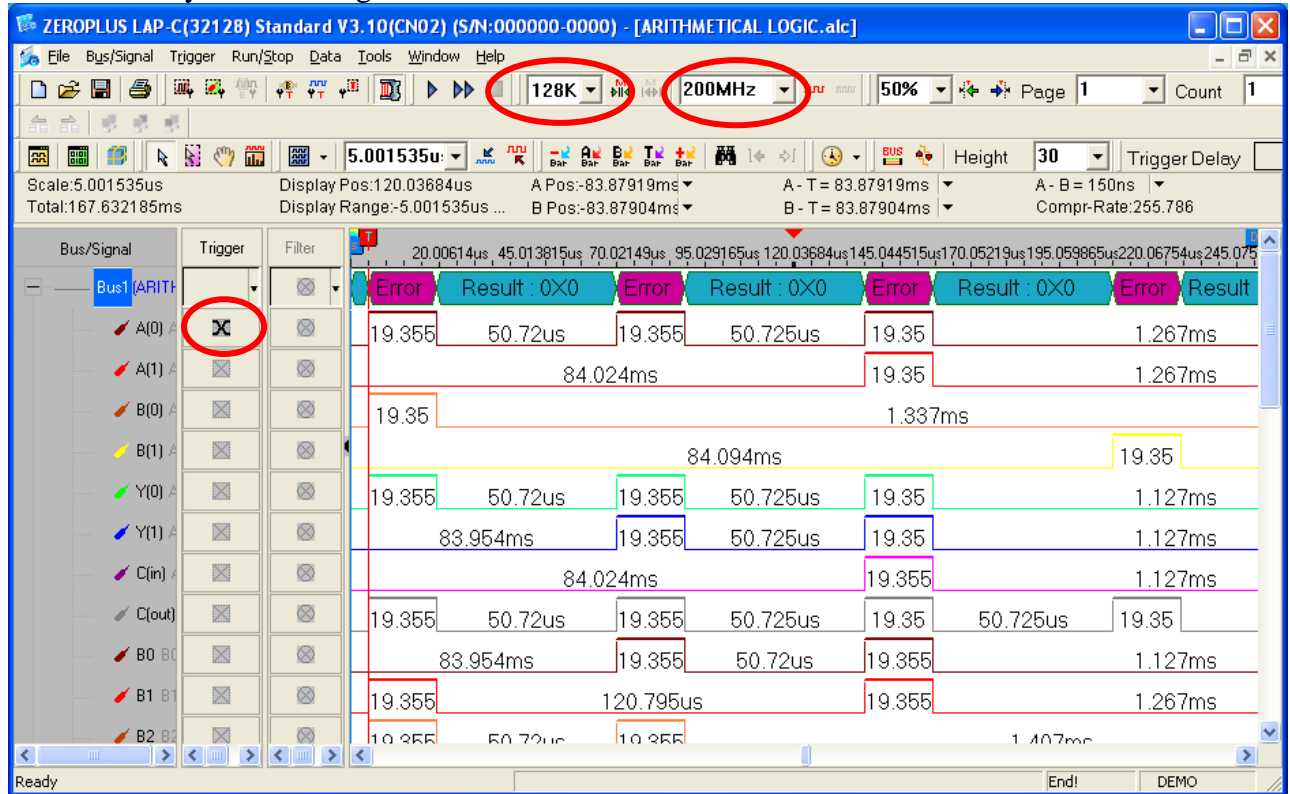
STEP 12. Set the **Protocol Analyzer Color**.





STEP 13. Following pictures show the completion of the protocol analyzer decoding and the packet list. The trigger condition is set as Either Edge; the memory depth is 128K; the sampling frequency is 200MHz (the sampling frequency should be more than four times higher than the signal to be tested).

Protocol Analyzer Decoding





Packet List

