



**孕龍科技股份有限公司**  
**ZEROPLUS TECHNOLOGY CO.,LTD**

# Instrument Division

## 1-WIRE **Manual**

Version : V1.0



## Revision History

Revision NO.	History	Date	Reviser
1.0	First version	2007/06/08	Eric Huang



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## 1 Preface

### 1.1 Aim

To increase the special bus feature in order to analyze the 1-Wire BUS 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 dialogue box so as to set up a special 1-Wire BUS dialogue box.

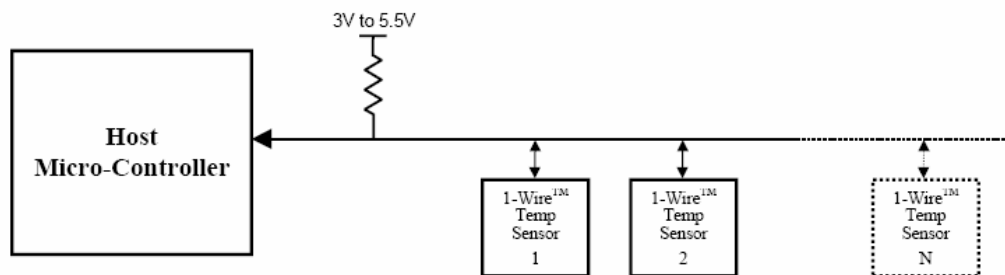


## 2 BUS Introduction

### 2.1 Brief Introduction

#### 2.1.1 Features

1-Wire BUS is a non-synchronic half-duplex serial transmission, which requires only one OWIO to transmit data. The typical 1-Wire BUS transmission structure is illustrated in Figure 1. During the 1-Wire BUS transmission, the OWIO can be used to transmit data and supply power to all devices connected to the 1-Wire BUS. 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 BUS can be divided into two types: standard and high speed. Every 1-Wire BUS has a unique 64-bit code for the device to recognize. Therefore, the maximum number of link devices is 1.8; almost unlimited.



#### 2.1.2 Applications

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

### 2.2 BUS Signal Specifications

Parameter	Value
Name of BUS	1-Wire
Required No. of Channels	1
Signal Frequency	Not fixed, around 10K
Appropriate Sampling Rate	1MHz
Same Data Time Per Bit?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Name of Syn. Signals	OWIO
Data Verification Point	30 us after the falling edge signals



## 2.3 BUS IO Description

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

## 2.4 BUS Electrical Specifications

Parameter	Min	Typ	Max	Unit	Note
High-count Voltage	2.8		5.2	V	Every IC varies according to the Pull-High voltage.
Low-count Voltage		0		V	



### 3 1-Wire BUS 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 Bus 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 read 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 low-count Reset Pulse (TX) of  $t_{RSTL}$  (Standard speed: 480us; High Speed: 48us) for a period of time.

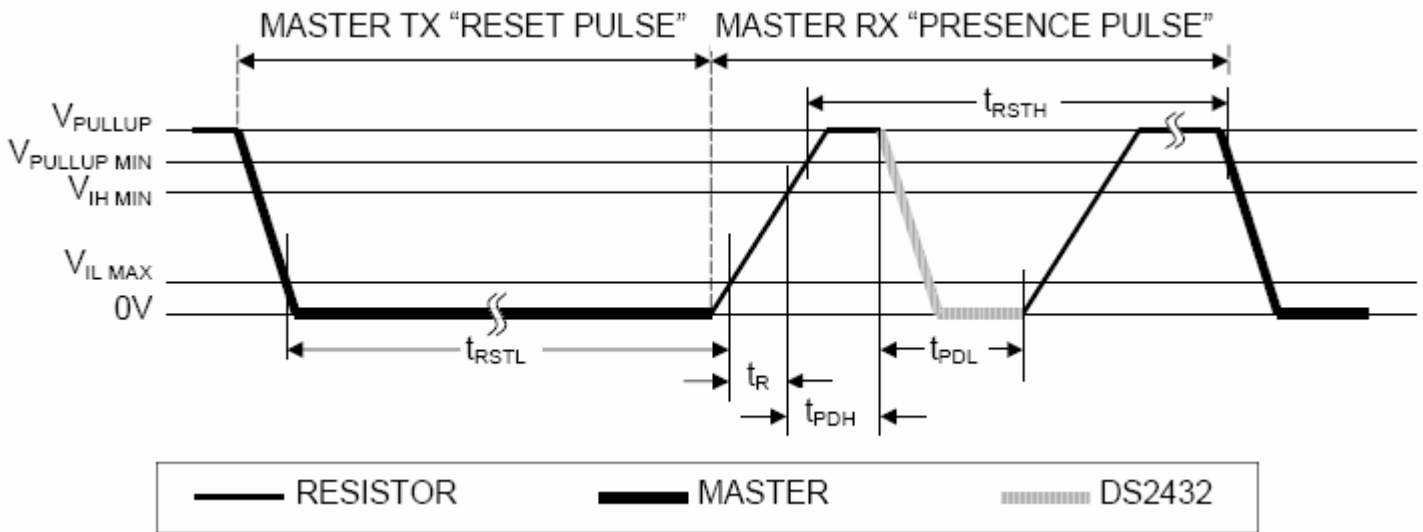


Figure 1

- (2) Then, Master releases BUS and enters the RX mode. Through high-pull resistor, 1-Wire Bus 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 Bus will be pulled back to the high status through the resistor.
- (5) Meanwhile, Master can detect any online Slave.





(6) From Figure 2, the low count Reset Pulse and Presence Pulse signals can be clearly seen.

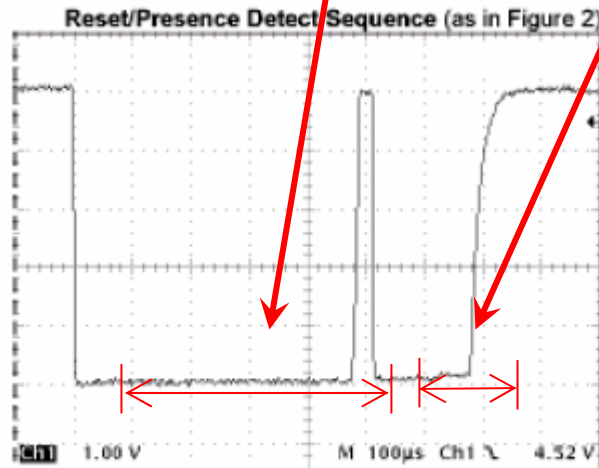


Figure 2a. You can clearly see the negative going reset and the presence pulse

Figure 2



## 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 a 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 figure 4:

### Write-zero Time Slot

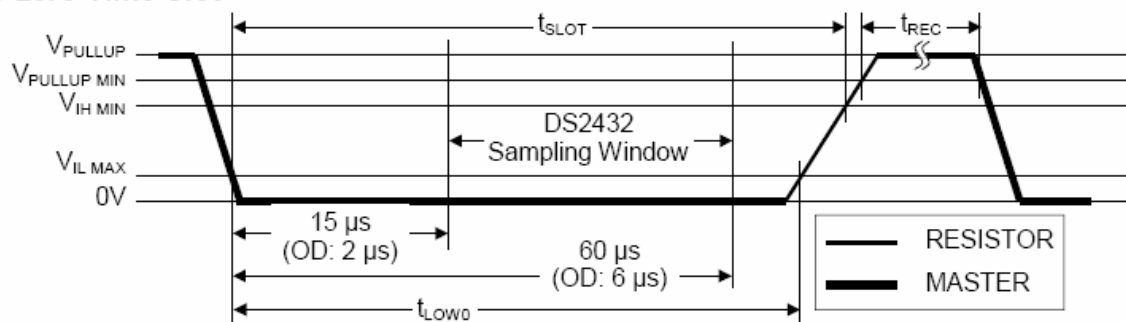


Figure 3

- B. Write 1: If the sampling is high, 1 is generated (note: Read 1 is of a similar wave pattern) as in Figure 5:

### Write-one Time Slot

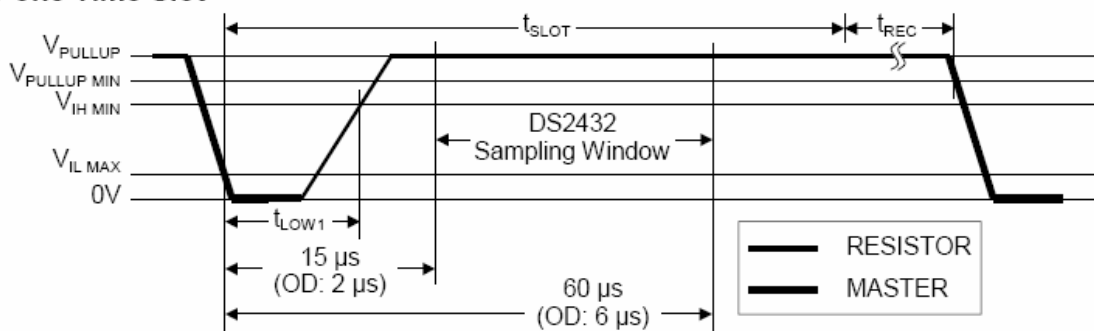


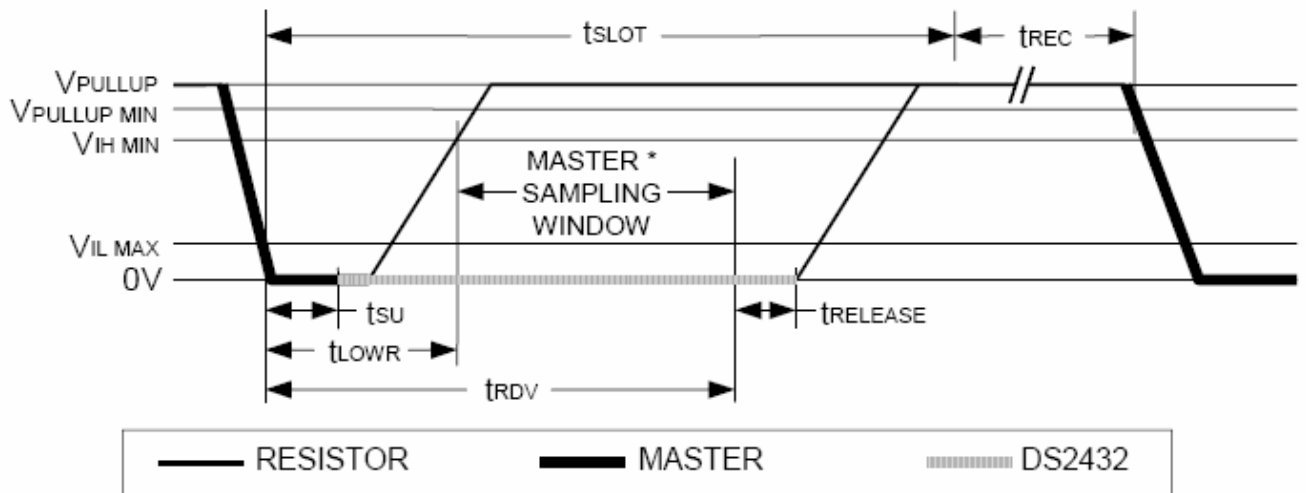
Figure 4



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**



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

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

**A typical 1-Wire conversation**

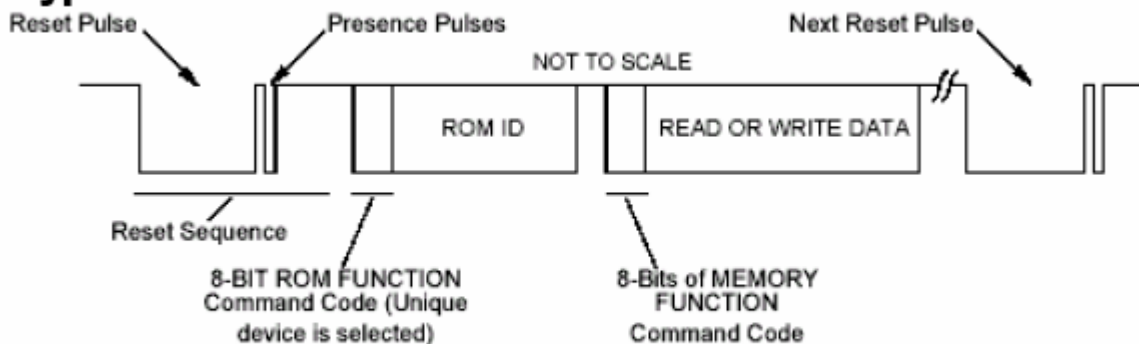


Diagram 1 typical 1-Wire communication sequence.

- (1) Master keeps Bus at low signal (standard speed: 480us; high speed: 48us) as the Reset Pulse.
- (2) Then, Master releases Bus 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 areas as illustrated below:

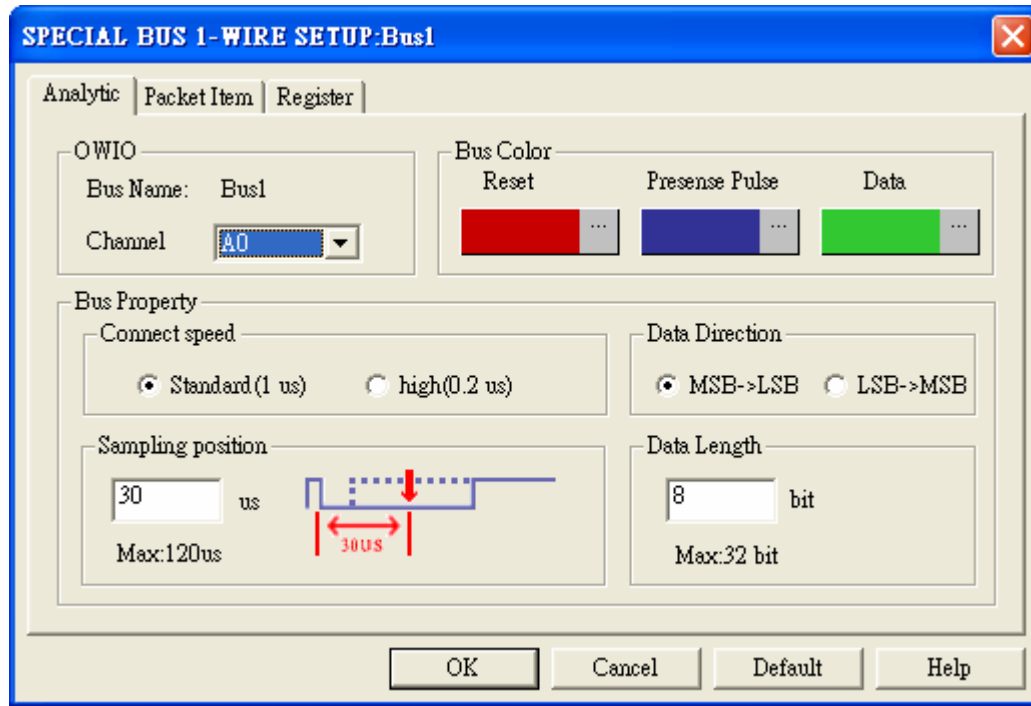
MSB		64-bit 'Registration' ROM number				LSB	
8-bit CRC		48-bit Serial Number				8-bit Family Code	
MSB	LSB	MSB		LSB	MSB	LSB	

- (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.



## 4 Human-machine Interface

### 4.1 Setup Dialogue Box Description



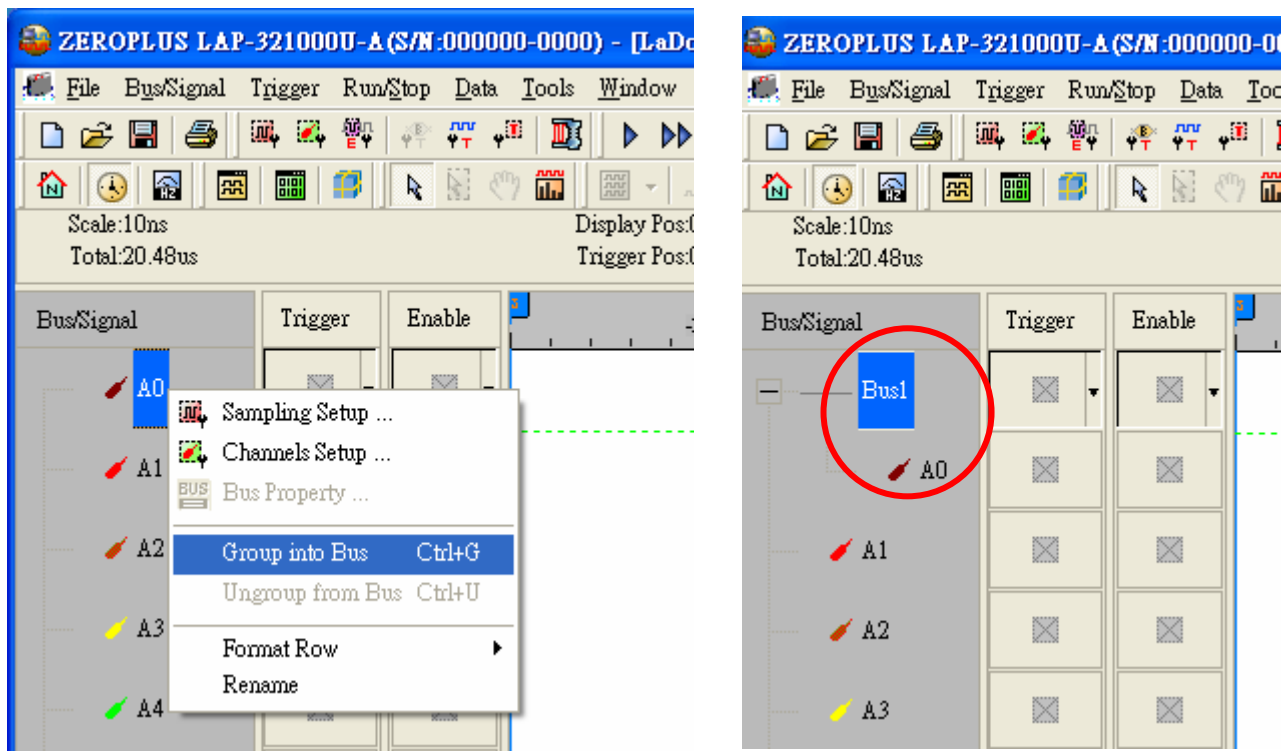
1. OWIO: Because there is only one wire for a signal, there are only two setup fields.  
Name of the Bus: Displays as OWIO Bus.  
Channel Selection: Presets as A0.
2. String Direction/Data Follow:  
MSB->LSB: From high to low bits.  
LSB->MSB: From low to high bits.
3. Link Speed/Speed:  
Standard : 1us  
High : 02us
4. BUS Color:  
Reset  
Presense Pulse  
Data



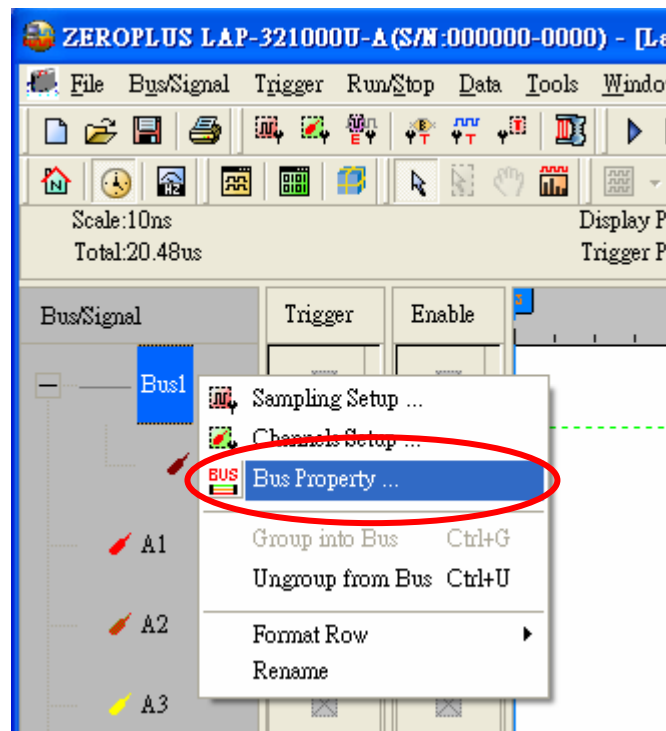
## 5 Instructions

### 5.1 Human-machine Interface Instructions

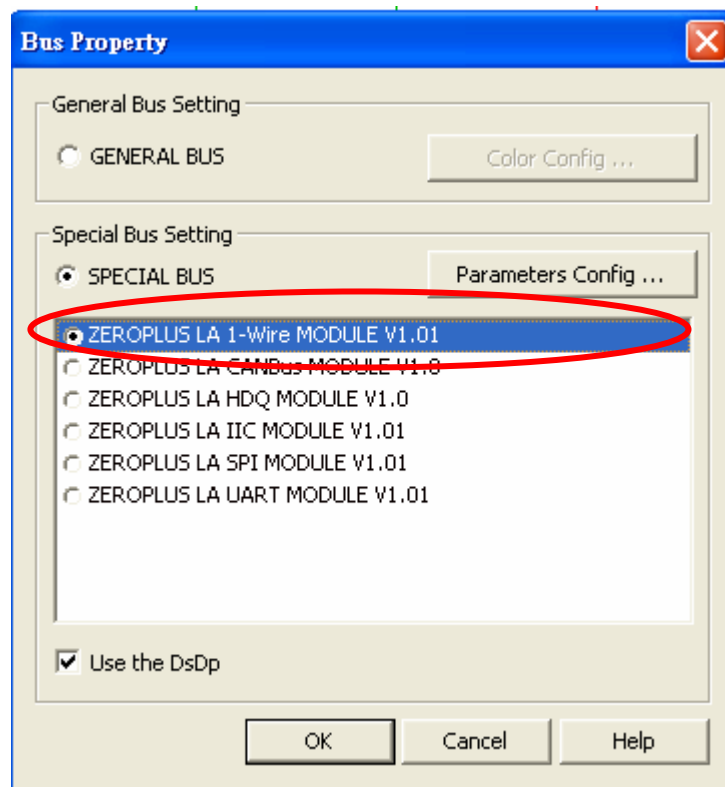
#### STEP 1. Set the analyzed channels as standard Buses.



#### STEP 2. Right click Bus channels or from Tools select Bus properties to create Bus settings.

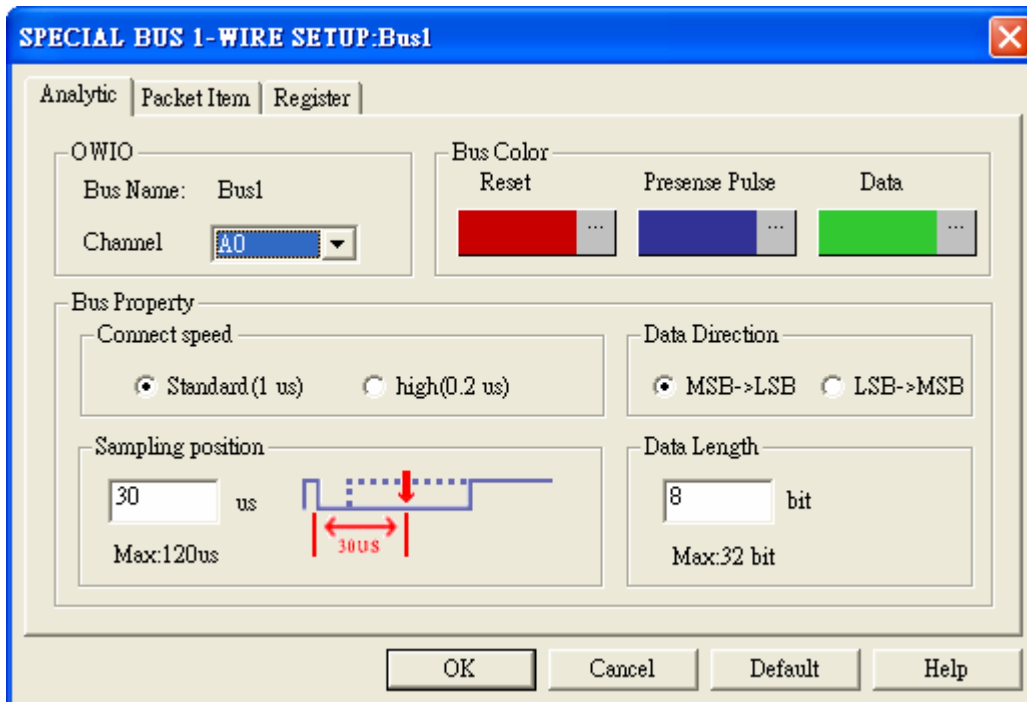


**STEP 3. From Special Bus Settings, select One Wire.**



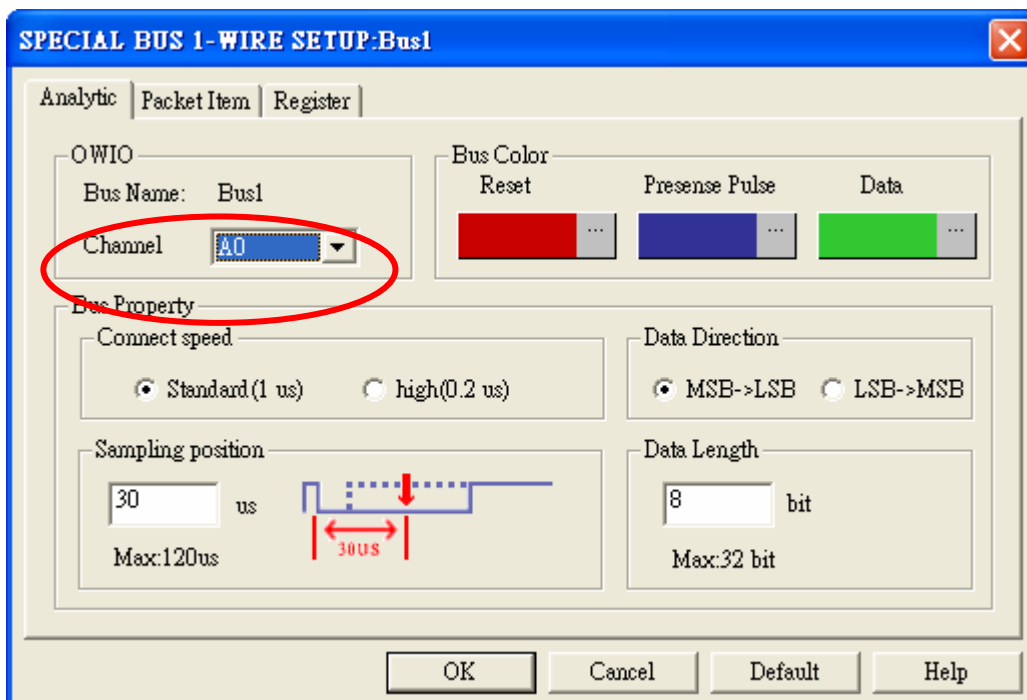


## STEP 4. Click Parameters to set Bus parameters.



## STEP 5. Select Channels

1-Wire has only one IO. Select the channel that is linked to the IO.

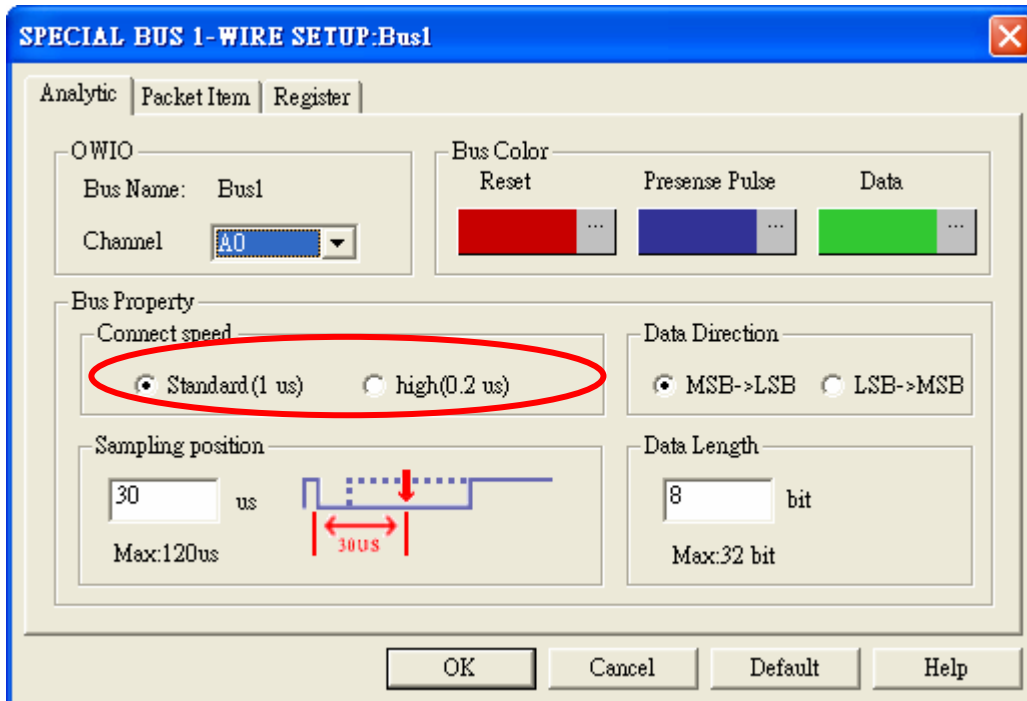






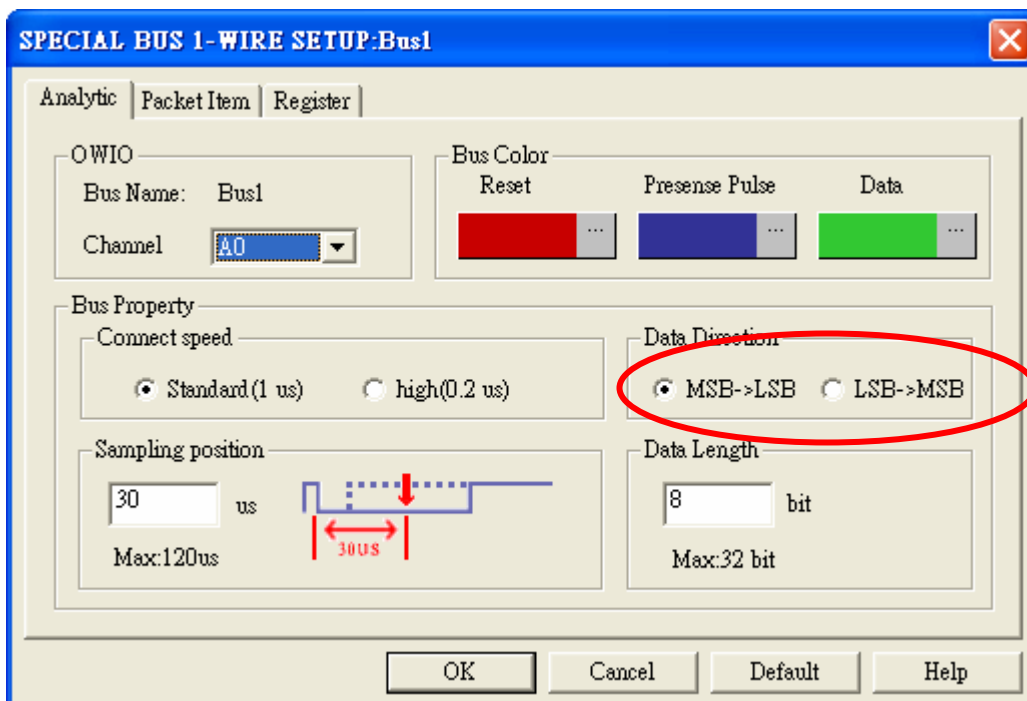
## STEP 6. Set Connection Speed

1-Wire has two modes: standard and high speed. Set the speed according to the specification of the object to be tested and the default mode is standard.



## STEP 7. Set String Direction

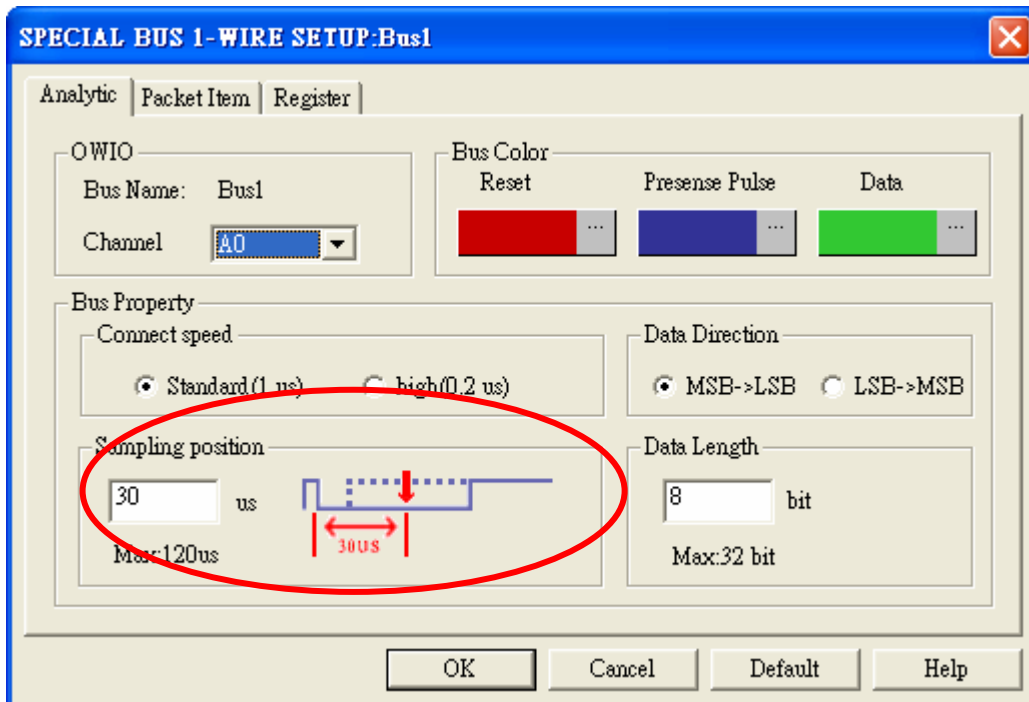
Set the String Direction to either MSB or LSB.





## STEP 8. Set Sampling Location

Can slightly adjust the sampling point of 1-Wire. This feature is applicable when the signal cannot be decoded. The default value is 30us.





## STEP 9. Set Data Length

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

