

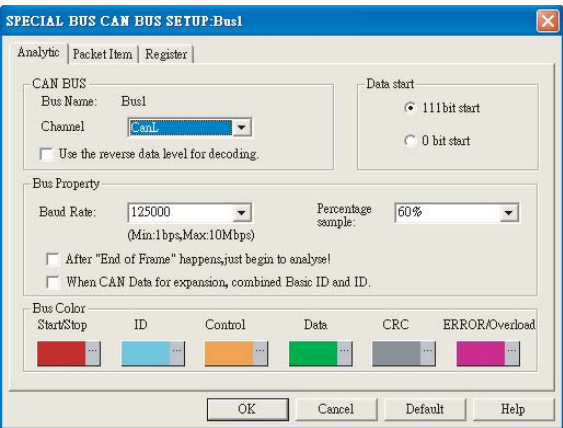
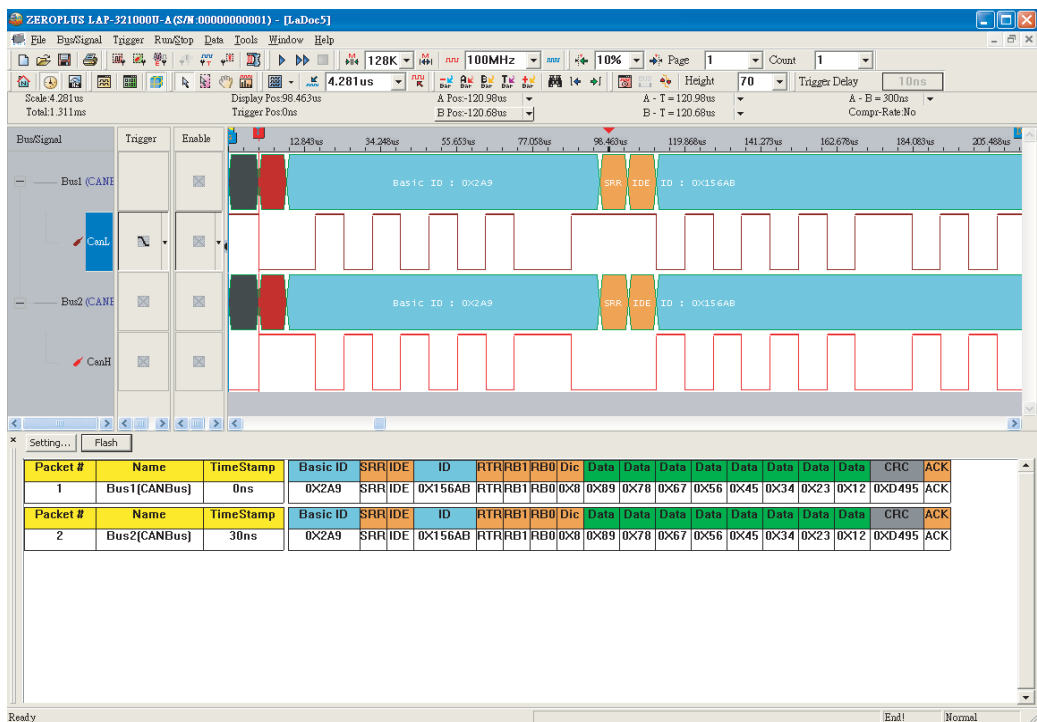
# ZEROPLUS PC-Based Logic Analyzer Special Bus Module Album

## Automotive ▶ CAN BUS, LIN BUS, FlexRay

### CAN-BUS

This signal consists of two signal wires and a grounding wire, because of excellent network feature, the signal can make user reduce making cost and supply strong detecting error rules, it also offer user reduce the error when correlative signals transfer, Can Bus signal is widely used for all kind of products, however, it is mostly used in automotive.

▶ The figure displays the Can Bus signal captured by Zeroplus Logic Analyzer as below, the signal captured by Zeroplus Logic Analyzer is in the above of the window, the below supplies the every signal format content, included Basic Can Frame, Peli Can Frame, Remote Frame, Error Frame and Overload Frame.



▶ The Figure below is the Parameters Configuration, user can set the timestamp position according to the signal model, in order to meet the customer's need.

And bus color can be varied according to user's sense, so that it can help user distinguish data and watch comfortably.

Besides adjusting speed, we can aim to its error to do sampling adjusting, in order to solve the obstacle to distinguish data.

## SPI

SPI is a four-wire bus which communicated in master-slave mode, which consists of Serial Clock (SC), Master In Slave Out (MISO), Master In Slave Out (MOSI) and Chip Select (CS), SPI is used widely, for example some ICD control, SD/MMC memory card, Flash/EEPROM and so on.

When SPI bus is used, it attends two data modes, (One is DATA IN/MISO, the other is DATA OUT/MOSI), if using the most general2 channels Oscilloscope tests this signal, it need test twice as the Figure1 below:

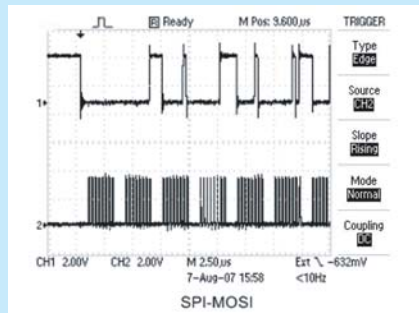


Figure 1: First test MOSI part, you should connect CS to EXTTRIG as trigger signal, and then connect CH1 to data, CH2 to SCK.

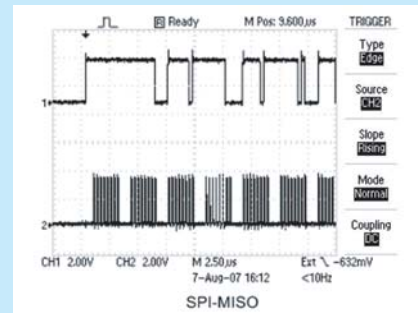
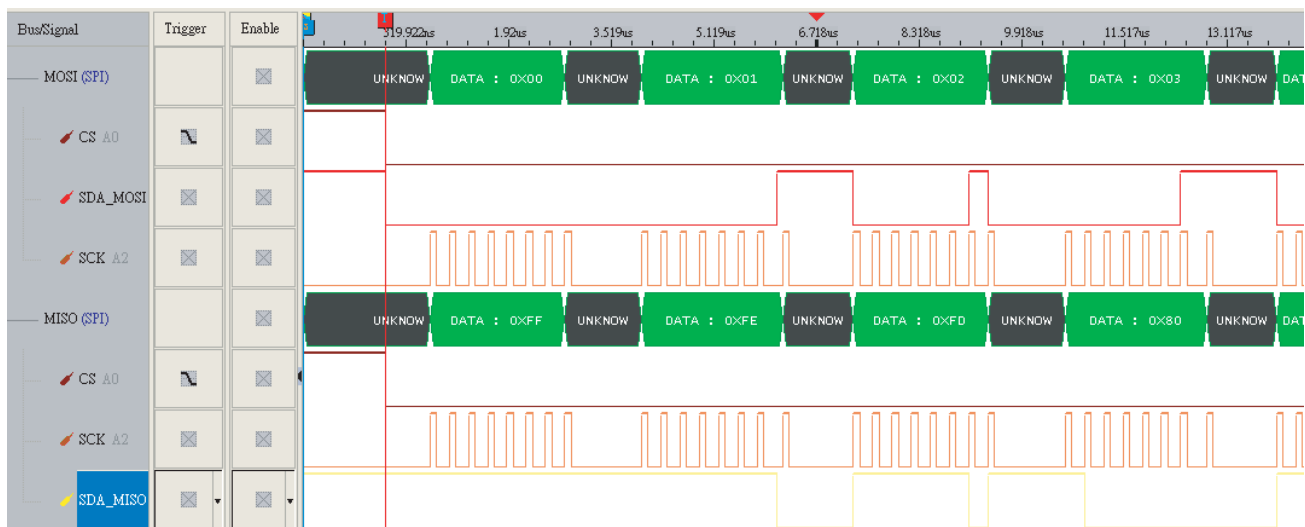


Figure 2: In the same way, you should change CH1 into MISO part according to setting way.

If it need test MOSI part again at this time, you should connect the Oscilloscope again. If using Zeroplus Logic Analyzer analyzes, due to having multi-center feature, it can completely gather those signals once, but if using Oscilloscope analyzes, it is no need to test repetitively.

- ▶ The tested result that using Zeroplus Logic Analyzer tested to the same signal as Figure 3 below, it is no need to test repetitively, at the same time, and using software coding function can display the data value of bus on screen.



- ▶ The figure below is the SPT Bus Setup Dialog Box, which is captured by Zeroplus Logic Analyzer, on the configuration; user can set the data direction and SPI mode (According to the different sampling modes, SPI can be separated into 4 modes ,they are 0.1.2.3). As to the Custom Setting (Figure 5), when SS is activated, user can customize the CS/SS High Level or Low Level, and also customize the length of data bit in signal (The range of length is 1 - 28 bit).



Figure 4

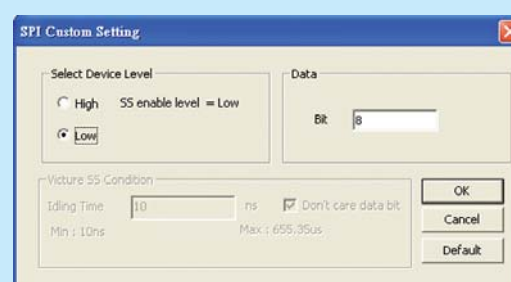


Figure 5

### I<sup>2</sup>S BUS

I<sup>2</sup>S (Inter-IC Sound Bus or Integrated interchip Sound) is one kind of BUS Standard for Philips company to make the digital message instruments' Audio-frequency data transmission, usually using in transmission CD's PCM message onto the DAC of CD. In the Philips company I<sup>2</sup>S Standard, it stipulates the Hardware interface and digital Audio-frequency data format.

In the Hardware program, I<sup>2</sup>S only uses three signal pin bits, to apart provide time-sharing multi-work: SD ATA, LRCK, SCLK. In the hardware circuitry, it not only uses channel quantity fewness, but also to adopt serial data to take apart SDATA and SCLK, to reduce signal transmission distortion condition.

As the users face the I<sup>2</sup>S signal, it's not only to spend the high cost for I<sup>2</sup>S analytic Audio-frequency Analyzer, but also only to use this way to analyze; but now, the ZEROPLUS Logic Analyzer put out the I<sup>2</sup>S signal Bus Module, to make the I<sup>2</sup>S signal easy to dispose.

▶ Referring to the Figure 1, the above dialog box is the ZEROPLUS Logic Analyzer Module Configuration dialog box, after user connects the circuitry, only to set up the relative channel and Bus Format, it can analyze. BUS can according to I<sup>2</sup>S in common use format to set up, it has three Formats: flush Left, I<sup>2</sup>S (it is the Philips stated format) and flush Right. It also can set up Data Bit: 16 bit, 20bit, 24 bit, 32 bit.

After completing setup, user can click the OK button in configuration dialog box, the software will display the Bus data automatically, to see the Figure 2.

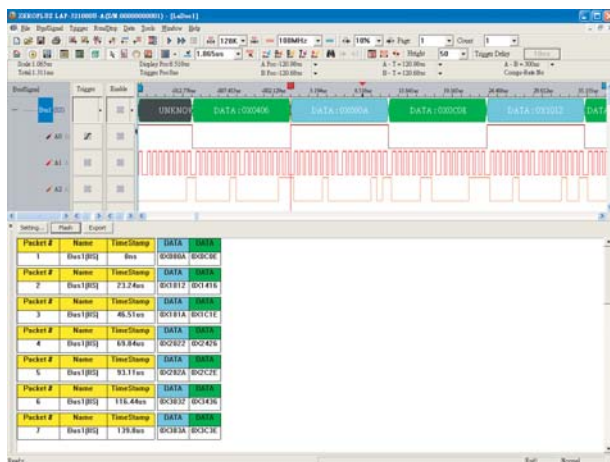


Figure 1

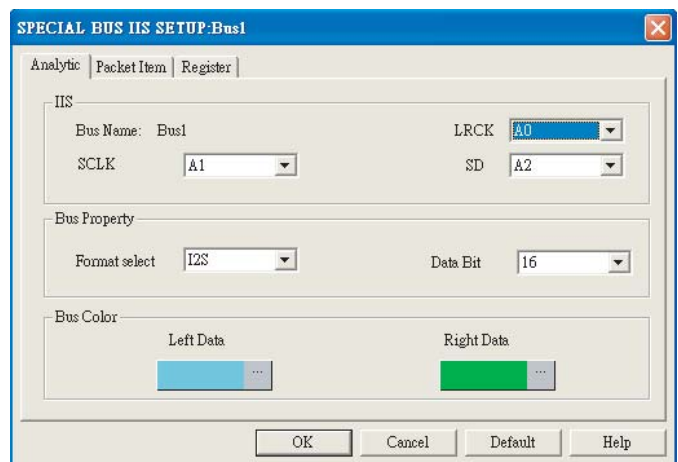


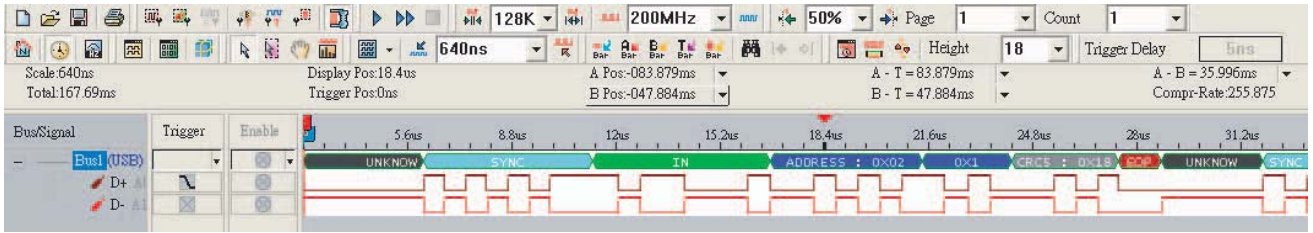
Figure 2

Trough the ZEROPLUS Logic Analyzer I<sup>2</sup>S Bus Module, there is no need to purchase the expensive Audio-frequency Analyzer and count the Bus data by yourself, then it can improve the work efficiency and quicken work speed in short-term.

### USB1.1

USB is a familiar interface, except for PC, Game Host and even part PDA supply USB interface for using. USB has hot-plugging feature, when USB device plug into Host, the Host can detect it, and the software marks it out, that is to say Plug and Play. USB connection offers device to supply Power, it can supply DC +5V voltage and about 100mA~500mA current. USB has four connection wires, the two are Power and grounding wire, the others are D+ and D- signal wires, generally the two wires are opposite. if one signal is high the other signal must be low. That differential signal can improve anti-yawp and anti-jamming abilities .USB makes use of D+ D- two differential signals to the aim of high speed transmission.

- ▶ Zeroplus Logic Analyzer newly adds to analyze USB1.1 function, so the Logic Analyzer can analyze LOW SPEED and FULL SPEEDUSB devices packages. The Result analyzed as the figure below, as long as you connect USB's D+ D- and grounding wire into Zeroplus Logic Analyzer, start analysis USB package function, and then you can see the USB package.



- ▶ Except that you can observe packet content when waveform displays, the USB is the same to other bus analysis and it also supports packet list function. User can be easier to observe packet content through packet list function.

Packet #	Name	TimeStamp	SYNC	Packet ID	DATA	DATA	DATA	DATA	DATA	CRC	Describe
1	Bus1(USB)	4.425us	SYNC	DATA0	0x00	0x00	0x40	0x0F	0x0F	0x0F	DATA0 FORMAT
Packet #	Name	TimeStamp	SYNC	Packet ID	Describe						
2	Bus1(USB)	70.795us	SYNC	ACK	ACK FORMAT						
Packet #	Name	TimeStamp	SYNC	Packet ID	ADDRESS	ENDPOINT	CRC	Describe			
3	Bus1(USB)	89.52us	SYNC	IN	0x02	0x01	0x18	IN FORMAT			
Packet #	Name	TimeStamp	SYNC	Packet ID	DATA	DATA	DATA	DATA	DATA	CRC	Describe
4	Bus1(USB)	115.32us	SYNC	DATA0	0x00	0x00	0x40	0x0F	0x0F	0x0F	DATA0 FORMAT
Packet #	Name	TimeStamp	SYNC	Packet ID	Describe						
5	Bus1(USB)	101.695us	SYNC	ACK	ACK FORMAT						
Packet #	Name	TimeStamp	SYNC	Packet ID	ADDRESS	ENDPOINT	CRC	Describe			
6	Bus1(USB)	200.42us	SYNC	IN	0x02	0x01	0x18	IN FORMAT			
Packet #	Name	TimeStamp	SYNC	Packet ID	DATA	DATA	DATA	DATA	DATA	CRC	Describe
7	Bus1(USB)	226.215us	SYNC	DATA0	0x00	0x00	0x40	0x0F	0x0F	0x0F	DATA0 FORMAT
Packet #	Name	TimeStamp	SYNC	Packet ID	Describe						
8	Bus1(USB)	292.59us	SYNC	ACK	ACK FORMAT						
Packet #	Name	TimeStamp	SYNC	Packet ID	ADDRESS	ENDPOINT	CRC	Describe			
9	Bus1(USB)	311.315us	SYNC	IN	0x02	0x01	0x18	IN FORMAT			
Packet #	Name	TimeStamp	SYNC	Packet ID	DATA	DATA	DATA	DATA	DATA	CRC	Describe
10	Bus1(USB)	337.115us	SYNC	DATA0	0x00	0x00	0x40	0x0F	0x0F	0x0F	DATA0 FORMAT



## IC Interface ▶ SSI, Microwire, JTAG

### SSI

The SSI synchronouse serial interface is the normal interface in different DSP processor, it uses in the wireless transmission communication (such as MOTOROLA,NORKIA COM.), servo power management, A/DC, D/AC transition, CODECS and so on. The SSI uses so flexible, it can through the relative control temporary instrument to set up the SSI interface into the application working mode, meanwhile, supporting the Synchronous/Asynchronous protocol, the other mode is ON-DEMAND Mode: it is one kind of no-period data transmission. This mode is similar with the SSI net mode or SPI, it can take as the special condition of SSI network mode or the SSI network mode's offshoot.

Generally speaking, the SSI Bus shows two data ways (one is TD,other is RD) about usage. If to use the 2Channel Oscillograph to measure the TD and RD signal of the SSI, it needs to measure more than twice, such as the Figure1 and 2. The range of the measurement signal is limited by the Oscillograph RAM size (about 24K), engineers analyze one segment signal will spend much more time, it influences the work efficiency, but to use the ZEROPLUS Logic Analyzer (RAM size: 128K~1M) measurement, it can economize much time.

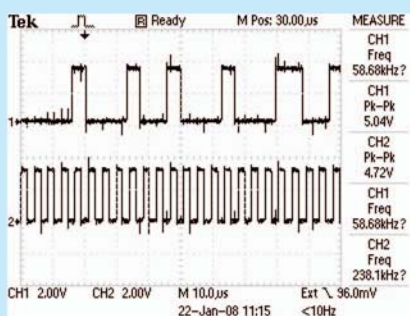


Figure 1: Firstly, to measure the TD part, connecting the FS with the EXT TRIG as the Trigger signal, then to put the CH1 to connect with the TD, connecting CH2 with the CLK.

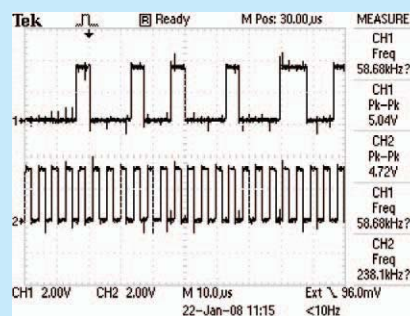


Figure 2: According to the Figure 1 setup method to change the CH1 part into RD.



- If to exchange the measurement instrument into the ZEROPLUS Logic Analyzer to measure SSI, it not only can test all the signals, but also can read all the signal value, the time is more four times than the Oscilloscope, to shorten the engineer's development time and improve the efficiency, and to make the product on the market earlier, to get the greatest benefits , Figure 3 and 4 for reference .

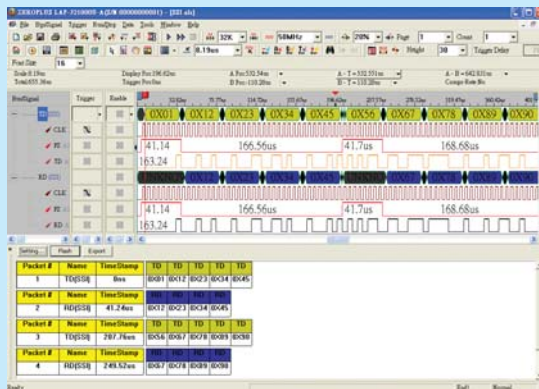


Figure 3

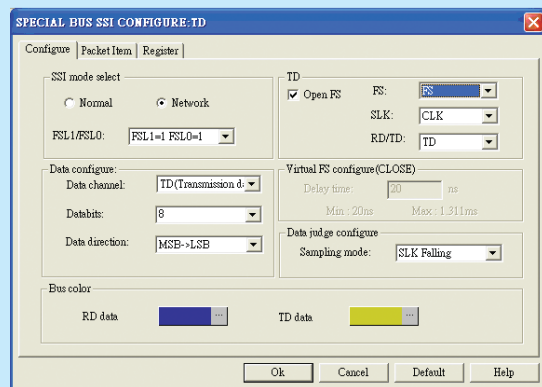


Figure 4

#### Characteristics:

1. Excepting the normal SLK FALLING decoding, it also can according to USER desire to customize the Rising edge to decoding.
2. The data's bit range is 4~32BIT.
3. If it is not convenient to search the FS signal, it can use the software and virtual FS to decoding.
4. DATA packet decoding, USER can customize the bits direction: MSB→LSB or LSB→MSB.

## Microwire

The Micro Wire standard of National Semiconductor Company is similar with the SPI, it also is the Synchronous serial interface. Otherwise, because the Micro Wire Standard hasn't the MAX data velocity, it is more used in the E2PROM, A/D converter, D/A converter.

## Others ►► 7-SEGMENT LED, HDQ, SIGNIA RF, MOD BUS, CCIR 656, LCD1602, Miller, IRDA

## 7-SEGMENT LED

The 7-Segment is used to display the digital signal, separating two specifications: Common Anode LED and Common Cathode LED, it has the low radiation power and long use-life...merits, using widely. Nay, ZEROPLUS Technology develop 7-Segment Display Module to match with the ZEROPLUS Logic Analyzer, to serve the people who need them.

To use the 7-Segment Display Module of ZEROPLUS Logic Analyzer, it has the following serial merits: displaying the value is right or wrong, knowing the time order relation of the value clearly and using the ZEROPLUS Logic Analyzer 32CH to measure can analyze four 7-Segment displays. Please refer to the below Figure 1 and Figure 2.

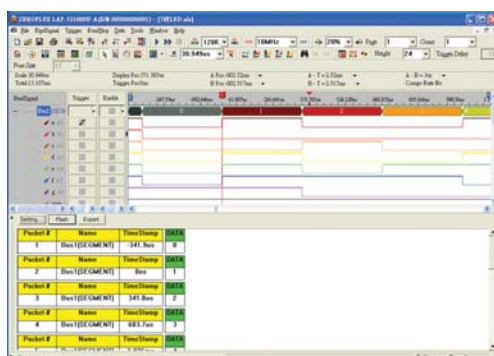


Figure 1

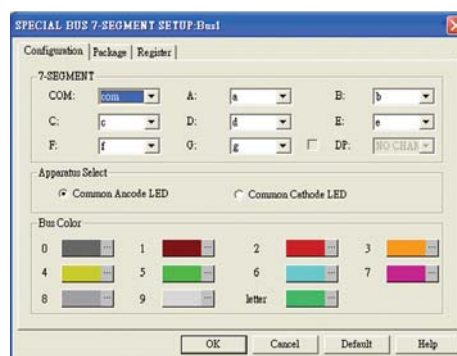


Figure 2

#### Characteristics:

Every Arabic numeral can be customized different color, it is convenient for USER to analyze.

It have the Common Anode LED and Common Cathode LED setup in Apparatus Select part, to provide USER for measuring different specification 7-Segment displays.

## Miller

MILLER is one kind of serial signal taking as the data information transmission between the induction card and acceptor machine in the Wireless instrument system RFID. Because it have the time order message and the longest time order limitation in the MILLER specification, also to reduce the direct inflow ponderance and has the better anti-jamming ability, so it is the best in common use serial signal in the non-touch access instrument.

## HDQ

HDQ BUS is one kind of Asynchronous semiduplex serial transmission, only to need one HDQ signal line, to use the similar PWM(Pulse Width Modulation) Trigger method to judge the serial data, it is widely used in the battery management display interface.

## MOD

MOD BUS communication protocol is one kind of network data information transmission serial signal to put out by the American Modicon company. It is used in the industry control field, such as electric power system, communication network system(TCP) and other electron control and so on, it obtains mostly PLC manufactures approbation.

Serial Communication Convention Analysis (Continues to Increase)	LAP-16064U	LAP-16128U	LAP-32128U-A	LAP-321000U-A	LAP-322000U-A	LAP-B(70256)	LAP-B(702000)
I <sup>2</sup> C	Free	Free	Free	Free	Free	Free	Free
UART	Free	Free	Free	Free	Free	Free	Free
SPI	Free	Free	Free	Free	Free	Free	Free
1-WIRE	Option	Option	Free	Free	Free	Free	Free
HDQ	Option	Option	Option	Free	Free	Free	Free
CAN BUS	Option	Option	Option	Free	Free	Free	Free
USB 1.1	Option	Option	Option	Option	Option	Free	Free
SIGNA RF	Option	Option	Option	Option	Option	Option	Option
I <sup>2</sup> S	Option	Option	Option	Option	Free	Free	Free
PS/2	Option	Option	Option	Option	Free	Free	Free
Microwire	Option	Option	Free	Free	Free	Free	Free
SSI	Option	Option	Free	Free	Free	Free	Free
S/PDIF	Option	Option	Option	Option	Option	Option	Option
Lin Bus	Option	Option	Option	Option	Free	Free	Free
Miller	Option	Option	Free	Free	Free	Free	Free
Manchester	Option	Option	Free	Free	Free	Free	Free
LPC Bus	Option	Option	Option	Option	Option	Option	Option
7-SEGMENT LED	Free	Free	Free	Free	Free	Free	Free



**ZEROPLUS**

Taipei Sales Office : 2F., No.123, Jian Ba Rd., Chung Ho City, Taipei County, R.O.C.

Tel:+886 2-6620-2225#221 Fax:+886 2-2223-4362

Hsinchu Sales Office : 6F., No.265, Wuling Rd., North District, Hsinchu City 300, Taiwan, R.O.C.

Tel:+886 3-542-6637#81 Fax:+886 3-542-4917

[www.zeroplus.com.tw](http://www.zeroplus.com.tw)

20080312