



**SMARTLAB**  
**USB 16 CHANNELS RELAY**  
**OUTPUT BOARD**

**OPERATION MANUAL**



Decision Computer Int'l. Co., Ltd.



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## CHAPTER 1

### INTRODUCTION

USB 16 channels relay output board provides 8 different relay output channels, and one RS232/RS422/RS485 port functions, which allow each relay channel can be used to control ON/OFF of external devices, to drive external power relays, to activate alarms... etc.

USB 16 channels relay output board provides one asynchronous serial communication port (RS232 or RS422 or RS485), which allows users to control the board by COM port.

USB 16 channels relay output board provides Plug and Play (PnP) features, it is a programmable I/O interface board for PC/486, Pentium, or compatibles. The on board high speed 8051 uC provides USB functions run at 12Mbps full speed or 1.5Mbps low speed.

#### ❖ The features of USB 16 channels relay output board are:

- USB2.0 with Plug and Play (PnP) features.
- High speed 8051 uC core.
- Support USB ID selection to identify USB device.
- Support 16 relay output channels
- 16 LED correspond to 16 output ports activation status.
- Allow to connect RS232 or RS422/RS485 extension board with DB9 connector to control.
- Power supplied from external DC +5V.



- Maximum contact rating is 220V/AC, 120V/DC 1AMP, minimum response time is 1ms, maximum contact resistance is 0.1 OHM.
- Suitable for Linux, MS/WINDOWS, ... etc.
- Operating temperature range from 0 to 33C.
- Relative humidity rage from 0 to 90%.

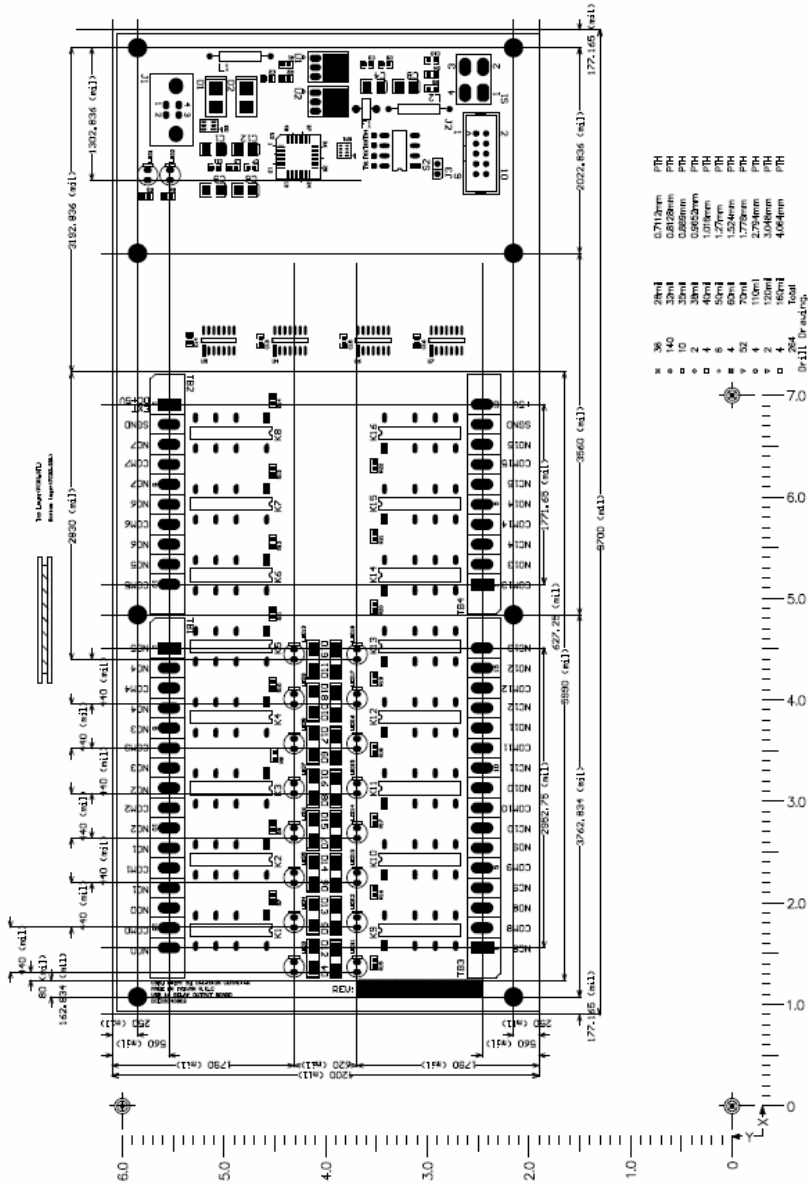
#### ❖ PACKAGE CONTENTS:

- SMARTLAB USB 16 channels relay output board.
- USB cable.
- Decision Studio and User's manual CD.
- Two Different Connector Types can be selected:

Standard: European P.C.B type terminal blocks  
Professional: Pluggable terminal blocks

#### Optional

- Extension board with DB9 : RS232 or RS422/485
- PCB Carrier



## CHAPTER 2

### HARDWARE CONFIGURATION

Before you use USB 16 channels relay output board, please ensure that the jumpers and switches setting. The proper jumper and switches settings for the 16 channels relay output board are described in the following.

#### 2.1 Switch Settings

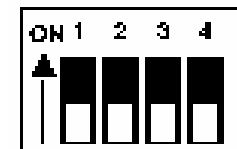
##### 1. S1 Reset



The S1 switch is used to reset 8051, the signal assignments are shown in the following.

Pin	Signals
3,4	Reset SW+
1,2	Reset SW-

##### 2. S2 USB ID





The S2 switch is used to identify USB board ID. Please set different board ID to each board (do not duplicate ID setting).

1	2	3	4	ID
ON	ON	ON	ON	--
OFF	ON	ON	ON	14
ON	OFF	ON	ON	13
OFF	OFF	ON	ON	12
ON	ON	OFF	ON	11
OFF	ON	OFF	ON	10
ON	OFF	OFF	ON	9
OFF	OFF	OFF	ON	8
ON	ON	ON	OFF	7
OFF	ON	ON	OFF	6
ON	OFF	ON	OFF	5
OFF	OFF	ON	OFF	4
ON	ON	OFF	OFF	3
OFF	ON	OFF	OFF	2
ON	OFF	OFF	OFF	1
OFF	OFF	OFF	OFF	0

### 3. Download revised firmware

When the S2 switch is set to ON ON ON ON status, means down load revised firmware. please follow the steps shown in the following:

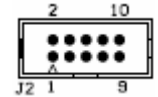
1. Set S2 to ON ON ON ON.
2. Run USBBootloader program to down load revised firmware.



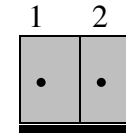
## 2.2 Jumper Settings

### Connector and Jumper for Serial Communication (J3)

To use RS422/RS485/RS232, please connect J2 to extension board by 10 pins flat cable. (Optional)



Enable Serial Port (J3)

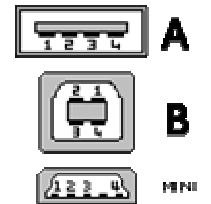


J3 is used enable serial port communication, when short the J3, means enable serial port, otherwise, when open the J3, the serial port communication is disable.

### 2.3 USB Connector

1. USB Connector

The USB connector is connected to computer USB port by using USB cable.



### 2.4 LED Status

1. LED1

The LED1 is an indicator to show the power is supplied normally.

2. LED2

The LED2 is an indicator to warning the USB link status. When it lights, it means USB connection works normally, otherwise it is fail.





## 2.5 Connector Assignments

The relay output signal pin assignments are shown in the below.

Pin	Signal	Description
1	NC0	Relay Ch. 00 - Output
2	COM0	Relay Ch. 00 - Output
3	NO0	Relay Ch. 00 - Output
4	NC1	Relay Ch. 01 - Output
5	COM1	Relay Ch. 01 - Output
6	NO1	Relay Ch. 01 - Output
7	NC2	Relay Ch. 02 - Output
8	COM2	Relay Ch. 02 - Output
9	NO2	Relay Ch. 02 - Output
10	NC3	Relay Ch. 03 - Output
11	COM3	Relay Ch. 03 - Output
12	NO3	Relay Ch. 03 - Output
13	NC4	Relay Ch. 04 - Output
14	COM4	Relay Ch. 04 - Output
15	NO4	Relay Ch. 04 - Output
16	NC5	Relay Ch. 05 - Output

Pin	Signal	Description
1	COM5	Relay Ch. 05 - Output
2	NO5	Relay Ch. 05 - Output
3	NC6	Relay Ch. 06 - Output
4	COM6	Relay Ch. 06 - Output
5	NO6	Relay Ch. 06 - Output
6	NC7	Relay Ch. 07 - Output
7	COM7	Relay Ch. 07 - Output
8	NO7	Relay Ch. 07 - Output
9	SGND	Signal Ground
10	EXT +5V	<b>External DC +5V 3A Power In</b>



Pin	Signal	Description
1	NC8	Relay Ch. 08 - Output
2	COM8	Relay Ch. 08 - Output
3	NO8	Relay Ch. 08 - Output
4	NC9	Relay Ch. 09 - Output
5	COM9	Relay Ch. 09 - Output
6	NO9	Relay Ch. 09 - Output
7	NC10	Relay Ch. 10 - Output
8	COM10	Relay Ch. 10 - Output
9	NO10	Relay Ch. 10 - Output
10	NC11	Relay Ch. 11 - Output
11	COM11	Relay Ch. 11 - Output
12	NO11	Relay Ch. 11 - Output
13	NC12	Relay Ch. 12 - Output
14	COM12	Relay Ch. 12 - Output
15	NO12	Relay Ch. 12 - Output
16	NC13	Relay Ch. 13 - Output

Pin	Signal	Description
1	COM13	Relay Ch. 13 - Output
2	NO13	Relay Ch. 13 - Output
3	NC14	Relay Ch. 14 - Output
4	COM14	Relay Ch. 14 - Output
5	NO14	Relay Ch. 14 - Output
6	NC15	Relay Ch. 15 - Output
7	COM15	Relay Ch. 15 - Output
8	NO15	Relay Ch. 15 - Output
9	SGND	Signal Ground
10	+5V	+5V





## CHAPTER 3

### DIAGNOSTIC UNDER WINDOWS/XP

USB Test Program.exe is a diagnostic program to test your USB devices under Windows/XP.

User can get USB Test Program.exe programs from Decision Studio CD.

## CHAPTER 4

### SOFTWARE PROGRAMMING UNDER WINDOWS/XP AND LINUX

Under Windows, we provide function library and dll file for users to program the device in supported language. You can find manual “USBDII\_Manual.pdf” and demo code in VB/VC/Delphi from Decision Studio CD.

Under Linux, we provide .c source to allow user directly to access device. You can find manual and example in “dcihid-0.5.1.tgz”.



## APPENDIX A

### WARRANTY INFORMATION

#### A.1 Copyright

Copyright DECISION COMPUTER INTERNATIONAL CO., LTD. All rights reserved. No part of SmartLab software and manual may be produced, transmitted, transcribed, or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of DECISION COMPUTER INTERNATIONAL CO., LTD.

Each piece of SmartLab package permits user to use SmartLab only on a single computer, a registered user may use he program on a different computer, but may not use the program on more than one computer at the same time.

Corporate licensing agreements allow duplication and distribution of specific number of copies within the licensed institution. Duplication of multiple copies is not allowed except through execution of a licensing agreement. Welcome call for details.

#### A.2 Warranty Information

SmartLab warrants that for a period of one year from the date of purchase (unless otherwise specified in the warranty card) that the goods supplied will perform according to the specifications defined in the user manual. Furthermore that the SmartLab product will be supplied free from defects in





materials and workmanship and be fully functional under normal usage.

In the event of the failure of a SmartLab product within the specified warranty period, SmartLab will, at its option, replace or repair the item at no additional charge. This limited warranty does not cover damage resulting from incorrect use, electrical interference, accident, or modification of the product.

All goods returned for warranty repair must have the serial number intact. Goods without serial numbers attached will not be covered by the warranty.

The purchaser must pay transportation costs for goods returned. Repaired goods will be dispatched at the expense of SmartLab.

To ensure that your SmartLab product is covered by the warranty provisions, it is necessary that you return the Warranty card.

Under this Limited Warranty, SmartLab's obligations will be limited to repair or replacement only, of goods found to be defective a specified above during the warranty period. SmartLab is not liable to the purchaser for any damages or losses of any kind, through the use of, or inability to use, the SmartLab product. SmartLab reserves the right to determine what constitutes warranty repair or replacement.

Return Authorization: It is necessary that any returned goods are clearly marked with an RA number that has been issued by SmartLab. Goods returned without this authorization will not be attended to.

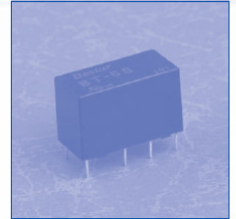


## APPENDIX B

### DATA SHEET

#### ■ FEATURES

- 2 Form C Contact
- DIL Pitch Terminals
- High Reliability Bifurcated Contact
- Conforms to FCC Part 68 1500V Surge and Dielectric Strength 1000VAC
- Fully sealed
- UL File No. E147052



#### ■ COIL RATING (at 20 °C)

Nominal Voltage (VDC)	Coil Resistance ( $\Omega \pm 10\%$ )	Nominal Current (mA)	Pick-Up Voltage (VDC)	Drop-Out Voltage (VDC)	Maximum Allowable Voltage(VDC)	Power Consumption (mW)
5	167	30	3.5	0.5	6.0	150
6	240	25	4.2	0.6	7.2	150
9	540	16.6	6.3	0.9	10.8	150
12	960	12.5	8.4	1.2	14.4	150
24	2880	8.3	16.8	2.4	28.8	200
48	7680	6.25	33.6	4.8	57.6	300

#### ■ ORDERING INFORMATION

BT-12 S

Coil Voltage	Coil Sensitivity
See Coil Rating	S : 150-300mW low consumption type

\*Nil : Power Consumption up to 560mW available upon request





■ SPECIFICATIONS

Model No.		BT
Contact Arrangement		2 Form C
Contact Type		Bifurcated
Contact Material		AgPd+Au Clad
Contact Resistance		Max. 60mΩ ( initial )
Contact Rating (at Resistive Load)	Max. Switching Voltage	220VAC, 150VDC
	Max. Switching Current	2A
	Max. Switching Power	30W(DC), 50VA(AC)
	Rated Load	1.25A 24VDC 0.5A 100VAC
Dielectric Strength		
Between Coil & Contacts		1000VAC(1 minute)
Between Contacts		1000VAC(1 minute)
Surge Strength		1500V
Operate Time		Max. 6m Sec
Release Time		Max. 4m Sec
Ambient Temperature		-30°C~+80 °C
Insulation Resistance		Min. 1000MΩ at 500VDC
Vibration Resistance		1.5mm D.A. 10-55HZ
Shock	Functional	10G
	Destruction	100G
Mechanical Life		2 x 10 <sup>7</sup> operations (at no load)
Electrical Life (Resistive Load)		2 x 10 <sup>6</sup> operations at 1mA 20m VAC
		2 x 10 <sup>6</sup> operations at 20mA 20 VDC
		1 x 10 <sup>5</sup> operations at 1.25A 24 VDC
		1 x 10 <sup>5</sup> operations at 0.5A 100 VAC
Weight		Approx. 6g

