





## CHAPTER 1

### INTRODUCTION

The USB 16 bit data acquisition board is a high precision data conversion/acquisition system. It contains 16 analog to digital(A/D) input channels with unipolar or bipolar selection, 2 digital to analog(D/A) output channels and 1 digital I/O channel with 16 bit line.

The USB 16 bit data acquisition board provides Plug and Play (PnP) features; it is a programmable I/O interface card 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 USB 16 bit data acquisition board can be connected to computer by using USB or RS232, RS422/RS485 communication links.

❖ **The features of the USB 16 bit data acquisition board are:**

- USB 2.0 with Plug and Play (PnP) features.
- High speed 8051 uC core.
- Support USB ID selection to identify USB device.
- Provides 16 A/D input channels and the resolution is 16 bits.
- Provides 2 D/A output channels and the resolution is 16 bits.
- Provides 1 digital input/digital output channels and the resolution is 16 bits.

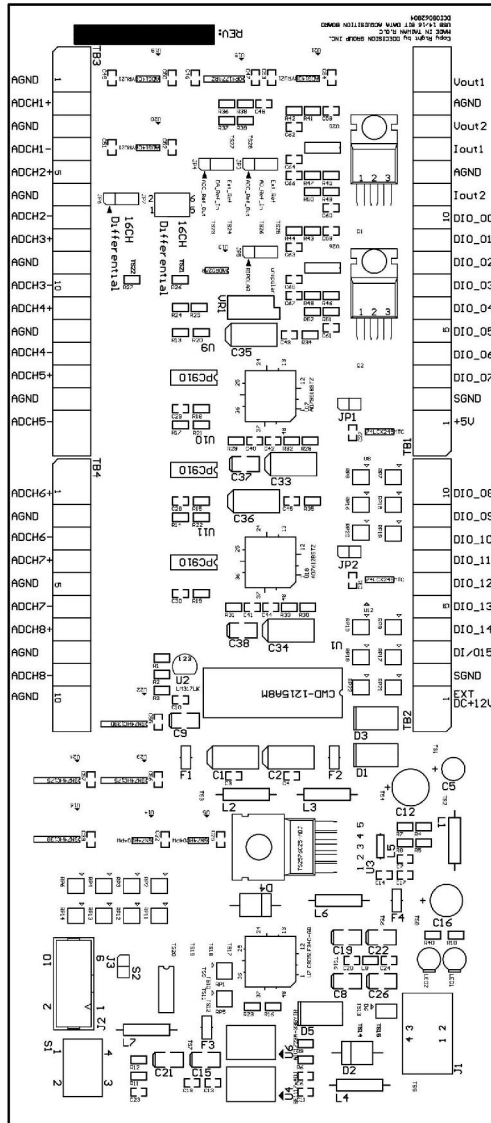


- Provides unipolar or bipolar input voltage range for A/D channel.
- Provides Differential mode for A/D channel.
- A/D input voltage range from 0 to 5V, 0 to 10V, -5V to 5V, or -10V to 10V.
- D/A voltage output range from 0 to 5 V, 0 to 10V, -5V to 5V, or -10V to 10V selectable.
- D/A current output range from 4 mA to 20 mA, 0 to 20 mA, or 0 mA to 24 mA.
- D/A output could set to normal or 10% over range.
- Allow to connect RS232 or RS422/RS485 extension board with DB9 connector.
- Power supplied from external DC +12V/2A.
- By using software commands to set up unipolar, bipolar, voltage range, current range,...etc.
- Suitable for Linux, WINDOWS/XP/VISTA/7, ... etc.
- Operating temperature range from 0 to 33C.
- Relative humidity rage from 0 to 90%.

❖ **PACKAGE CONTENTS:**

- USB 16 bit data acquisition board.
- USB cable.
- Optional extension board with DB9 connector, select one of the following:
  1. RS232 KIT DCI09031800\_A
  2. RS422/485 KIT DCI09031800\_B
- User's manual.
- Decision Studio CD for USB LAB KITS software.
- Warranty form.





## CHAPTER 2 HARDWARE CONFIGURATION

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

### 2.1 Switch Settings

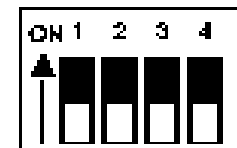
1. S1 Reset



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 card ID. Please set different card ID to each card (do not duplicate card ID setting).

1	2	3	4	Card ID
ON	ON	ON	ON	Reserved
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. Down load revised firmware

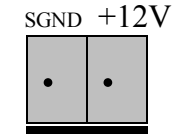
When the S2 switch is set to ON ON ON ON status, means download revised firmware. Please follow the steps shown in the following:

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



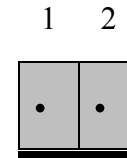
## 2.2 Jumper Settings

### 1. External Power Input (TB2)



The power of USB 16 bit data acquisition board can be supplied from USB; however, if USB can not supply enough power, the external power is need. To input external power, please use the pin 1 and pin 2 connectors of TB2. Be careful to input DC +12V power.

### 2. Digital Input/Digital Output Mode Selection (JP1 to JP2)

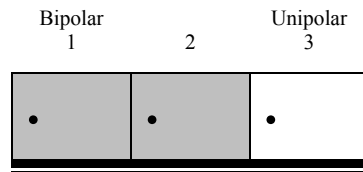


JP1 and JP2 are used to select input/output mode of digital I/O. When short JP1 means select input mode for DIO0 to DIO7, otherwise open JP1 means select output mode for DIO0 to DIO7. When short JP2 means select input mode for DIO8 to DIO15, otherwise open JP2 means select output mode for DIO8 to DIO15.





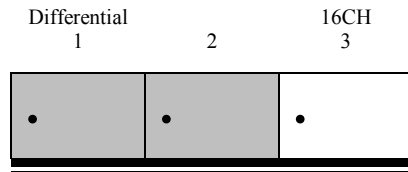
### 3. ADC converter range selection (JP3)



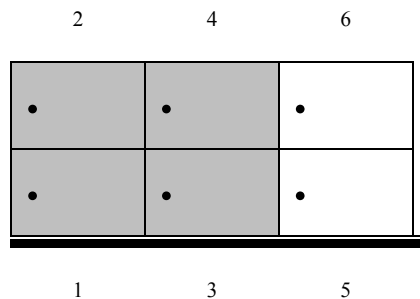
JP3 is used to select Bipolar/Unipolar of ADC converter range. When short pin 1 and pin 2 means select bipolar of ADC input, otherwise short pin 2 and pin 3 means select unipolar of ADC input.

### 4. ADC input mode selection (JP4 to JP5)

JP4



JP5



JP4 and JP5 are used to select ADC input mode. When short pin 1 and pin 2 of JP4 and pin 1 and pin 3, pin 2 and pin 4 of JP5 means select Differential mode of ADC input. In Differential mode, the ADC provides 8 input channels. To short pin 2 and pin 3 of JP6 and pin 4 and pin 6, pin 3 and pin 5 of JP7 means select 16 channels of ADC input.

The channel address of Differential mode and 16 channels modes are shown in below:

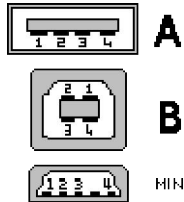
Channel address	Differential mode		16 channels mode	
	+ input	- input	+ input	- input
0	ADCH1+	ADCH1-	ADCH1+	AGND
1	ADCH2+	ADCH2-	ADCH2+	AGND
2	ADCH3+	ADCH3-	ADCH3+	AGND
3	ADCH4+	ADCH4-	ADCH4+	AGND
4	ADCH5+	ADCH5-	ADCH5+	AGND
5	ADCH6+	ADCH6-	ADCH6+	AGND
6	ADCH7+	ADCH7-	ADCH7+	AGND
7	ADCH8+	ADCH8-	ADCH8+	AGND
8	N/A	N/A	ADCH1-	AGND
9	N/A	N/A	ADCH2-	AGND
10	N/A	N/A	ADCH3-	AGND
11	N/A	N/A	ADCH4-	AGND
12	N/A	N/A	ADCH5-	AGND
13	N/A	N/A	ADCH6-	AGND
14	N/A	N/A	ADCH7-	AGND
15	N/A	N/A	ADCH8-	AGND





### 2.3 USB Connector

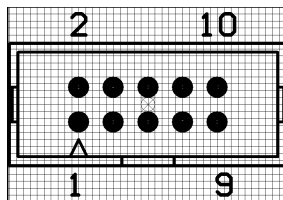
1. USB Connector (J1)



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

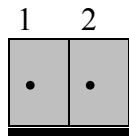
### 2.4 Connector and Jumper for Serial Communication

1. The connector of serial communication (J2)



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

2. Enable Serial Port (J3)



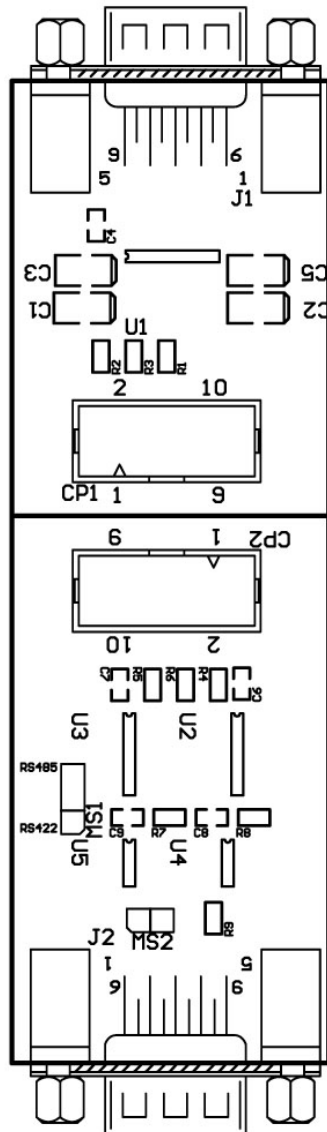
J3 is used enable serial port communication, when short the J3, means enable serial port, otherwise, when open the J3, the serial port communication is disabled.

### 2.5 Extension Board for Serial Communication

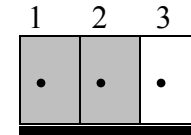
Extension boards with DB9 connector for RS232 or RS422/RS485 are optional products; user can connect USB industry control board to computer by using serial communication. Please follow the steps in bellows:

1. By using 10 pins flat cable to connect J2 of USB 16 bit data acquisition board and CP1(RS232)/CP2(RS422/RS485) on the extension board.
2. Connect J1(RS232)/J2(TS422/RS485) of extension board to computer RS232 or RS422/RS485 port.

The diagram of these extension boards are shown in the following:



5. RS422/RS485 Selection (MS1)



The MS1 is located at RS422/RS485 extension board. MS1 is used to set RS422/RS485 communication, when short pin 1 and pin 2, means set RS422. When short pin 2 and pin 3, means set RS485.

6. Long Distance Communication (MS2)

The MS2 is located at RS422/RS485 extension board. MS2 is used to set long distance communication, when short the MS2, means long distance communication. Otherwise, open the MS2, means normal distance communication.

2.6 Connector Assignments

The input/output signals of USB 16 bit data acquisition board are assigned in the TB1 to TB4 connector, its pin assignments are show in the below.



TB1

Pin	Signal	Description
1	+5V	+5V
2	SGND	Signal Ground
3	DIO_07	DIO Line 7
4	DIO_06	DIO Line 6
5	DIO_05	DIO Line 5
6	DIO_04	DIO Line 4
7	DIO_03	DIO Line 3
8	DIO_02	DIO Line 2
9	DIO_01	DIO Line 1
10	DIO_00	DIO Line 0
11	IOUT2	D/A Current Output 2
12	AGND	Analog Ground
13	IOUT1	D/A Current Output 1
14	VOUT2	D/A Voltage Output 2
15	AGND	Analog Ground
16	VOUT1	D/A Voltage Output 1



TB2

Pin	Signal	Description
1	EXT DC+12V	External DC +12V Power
2	SGND	Signal Ground
3	DIO_15	DIO Line 15
4	DIO_14	DIO Line 14
5	DIO_13	DIO Line 13
6	DIO_12	DIO Line 12
7	DIO_11	DIO Line 11
8	DIO_10	DIO Line 10
9	DIO_9	DIO Line 9
10	DIO_8	DIO Line 8

TB3

Pin	Signal	Description
1	AGND	Analog Ground
2	ADCH1+	Analog input channel 1 +
3	AGND	Analog Ground
4	ADCH1-	Analog input channel 1 -
5	ADCH2+	Analog input channel 2 +
6	AGND	Analog Ground
7	ADCH2-	Analog input channel 2 -
8	ADCH3+	Analog input channel 3 +
9	AGND	Analog Ground
10	ADCH3-	Analog input channel 3 -
11	ADCH4+	Analog input channel 4 +
12	AGND	Analog Ground
13	ADCH4-	Analog input channel 4 -
14	ADCH5+	Analog input channel 5 +
15	AGND	Analog Ground
16	ADCH5-	Analog input channel 5 -







TB4

Pin	Signal	Description
1	ADCH6+	Analog input channel 6 +
2	AGND	Analog Ground
3	ADCH6-	Analog input channel 6 -
4	ADCH7+	Analog input channel 7 +
5	AGND	Analog Ground
6	ADCH7-	Analog input channel 7 -
7	ADCH8+	Analog input channel 8 +
8	AGND	Analog Ground
9	ADCH8-	Analog input channel 8 -
10	AGND	Analog Ground



### CHAPTER 3

## WINDOWS/XP/VISTA/7

## CONFIGURATION

The USB 16 bit data acquisition board can be install to Windows/XP/VISTA/7 via USB plug and play function, please follow the steps shown in the following:

1. For optimum PnP functionality, please install one board at a time.
2. Windows will detect the new USB 16 bit data acquisition board that is installed in your computer, and will prompt you for a proper driver.
3. Install Virtual COM port (VCP) drivers which is in Drivers \ Virtual COM \ Virtual\_COM.inf.. Virtual COM port (VCP) drivers cause the USB device to appear as an additional COM port available to the PC. Application software can access the USB device in the same way as it would access a standard COM port.
4. After Windows/XP has detected and configured all ports, you may begin using the USB 16 bit data acquisition board. To verify that the installation process completed successfully, please proceed into the Control Panel / System / Device Manager.
5. Locate the additional COM ports in the ports section with VID 6666 and PID 81BB.





## CHAPTER 4

# SOFTWARE PROGRAMMING UNDER WINDOWS/XP/VISTA/7 AND LINUX

The LABKIT\_host is a diagnostic program to test your USB industry control board under Windows/XP/VISTA/7. User can get LABKIT\_host programs from Decision Studio CD.

The USB 16 bit data acquisition board can be installed in the Linux by using serial device driver supported by Linux. For more details, please refer to 'setserial' man-pages. After the Linux recognizes the serial port, it will assign device name as /dev/ttyACM0 for the first serial port, and /dev/ttyACM1 for the second serial port, ...etc.

To input/output data from USB 16 bit data acquisition board, please use Hid API functions. User can get Hid API functions from Decision Studio package.



## APPENDIX A

# WARRANTY INFORMATION

### A.1 Copyright

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