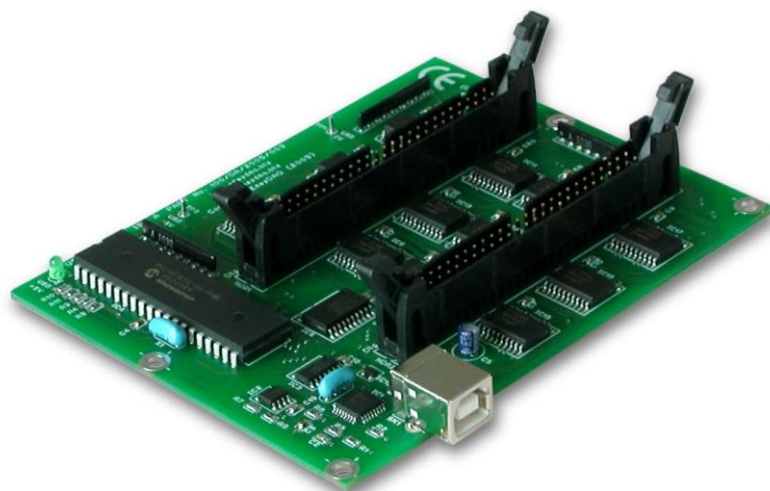


Product Datasheet 24
Features

- USB, hot pluggable, 96 channel digital output card
- Pin compatible with NIDAQ DIO96, PXI-6508, PCI-6509, PCI-DIO96 & DAQPAD6508 digital I/O cards
- Example code downloads available for: Labview, VB, VC, C#, JAVA, Agilent VEE & Delphi. Uses simple ASCII/Hex text command strings
- OS compatibility: Win98SE/ME/2K/XP/Vista/7, Windows CE, Mac OSX and Linux
- Output channels use 74HCT type devices. These are specified as: VOL = 0.4V, VOH= 3.7V, IOU= 4mA.
- Low cost, small profile, stackable
- 2 x 50 way header access to each of the 96 digital output channels
- Designed to be compatible with our DIO96Adapter card, and our range of stacked or shelf mounted, 24 channel relay cards, or can be used stand alone.
- Fully compatible with our 96 channel relay cards in either stack, 2U or 3U shelf formats
- Onboard LED indicator shows power on function
- Supplied with nylon feet. Clear Perspex cover & base available.
- CE & RoHS compliant, BS9001:2000 manufacture


Description

Low cost, general purpose, 96 channel USB digital output card.

Pin compatible with our DIO96Adapter and our range of 96 channel relay stacks, 2U (up to 96 channels) and 3U (upto to 192 channel) shelf options. It is also pin compatible with the NIDAQ DIO96, PXI-6508, PCI-6509, PCI-DIO96 & DAQPAD6508 cards. Hot pluggable and powered from the USB port.

LabView, C & Visual Basic example programs available which demonstrate the functionality of the card.

Specifications
USB Interface

USB 1 & 2 compatible (virtual COM port)

Digital output signals

Output high, 3.7V DC (Typ), output low 0.4V (max), 4mA typ per output channel.

Operating temp range

0-70°C

Power

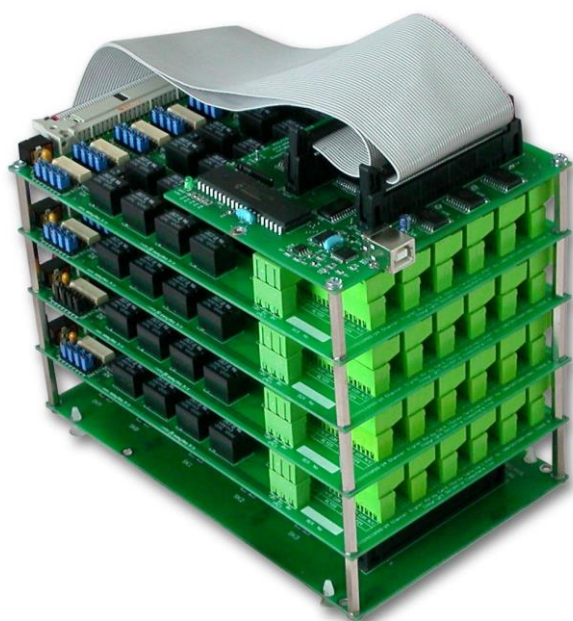
5V DC @ 50mA (max), powered from the USB port.

Dimensions

Dimensions 100mm (D) 127mm (W) 25mm (H) (exc feet), Weight 50g.

Order code
USBDO96

96 channel, USB compatible digital output card. Pin compatible with the NIDAQ DIO96 card and with our range of 24 channel relay cards & 96 channel relay stack options. 50 way (male) header connector access to all digital output signals. (See page 2 for header pin connections).



Product Datasheet 24

50 Way Header
connector pin
connections
(HDR1 & HDR2)

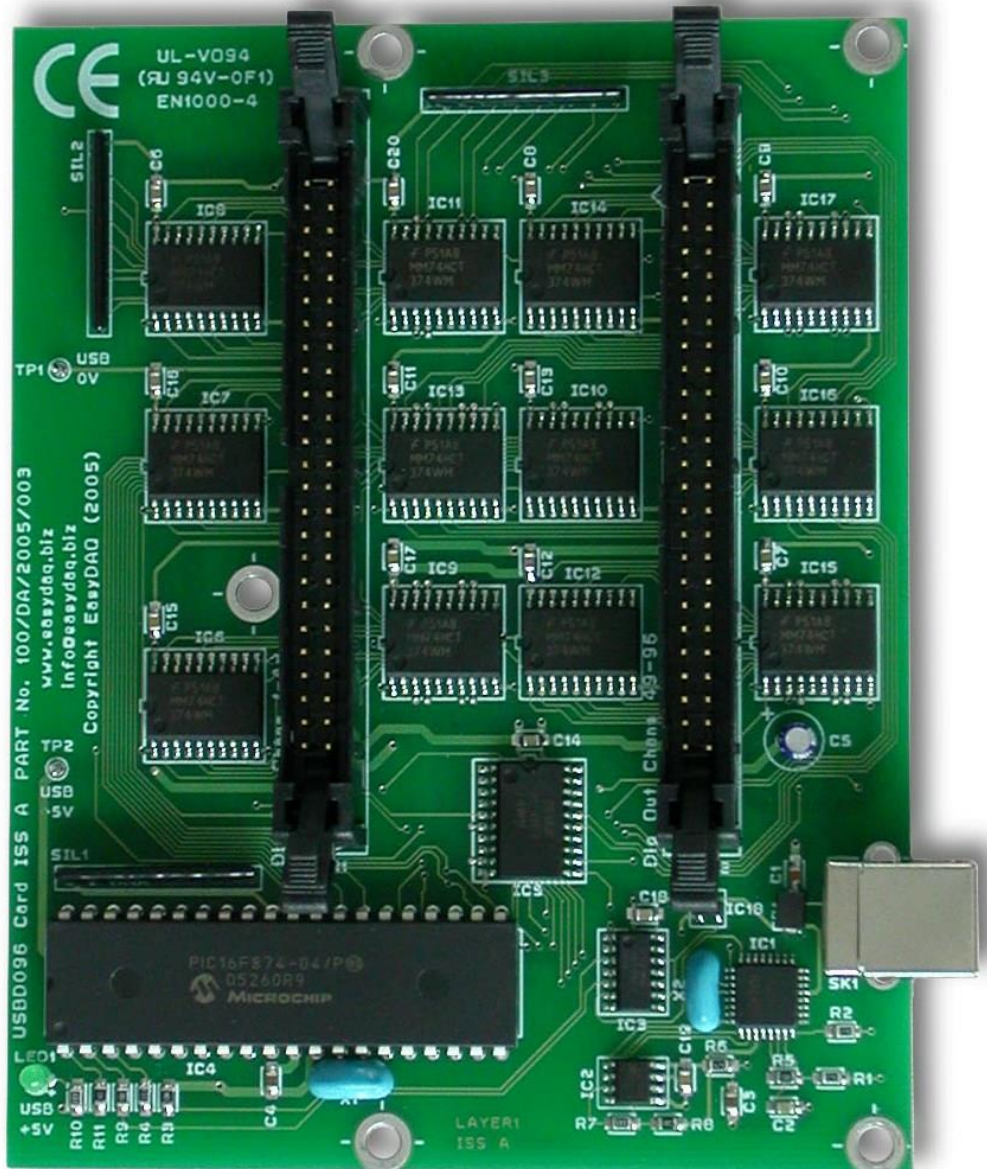
5V	HDR1		
(DO 1)	49	HDR1	HDR1
(DO 2)	47	(DO 17)	(DO 33)
(DO 3)	45	(DO 18)	(DO 34)
(DO 4)	43	(DO 19)	(DO 35)
(DO 5)	41	(DO 20)	(DO 36)
(DO 6)	39	(DO 21)	(DO 37)
(DO 7)	37	(DO 22)	(DO 38)
(DO 8)	35	(DO 23)	(DO 39)
	33	(DO 24)	(DO 40)

	HDR1	HDR1	HDR1
(DO 9)	31	(DO 25)	(DO 41)
(DO 10)	29	(DO 26)	(DO 42)
(DO 11)	27	(DO 27)	(DO 43)
(DO 12)	25	(DO 28)	(DO 44)
(DO 13)	23	(DO 29)	(DO 45)
(DO 14)	21	(DO 30)	(DO 46)
(DO 15)	19	(DO 31)	(DO 47)
(DO 16)	17	(DO 32)	(DO 48)
	50		

5V	HDR2		
(DO 49)	49	HDR2	HDR2
(DO 50)	47	(DO 65)	(DO 81)
(DO 51)	45	(DO 66)	(DO 82)
(DO 52)	43	(DO 67)	(DO 83)
(DO 53)	41	(DO 68)	(DO 84)
(DO 54)	39	(DO 69)	(DO 85)
(DO 55)	37	(DO 70)	(DO 86)
(DO 56)	35	(DO 71)	(DO 87)
	33	(DO 72)	(DO 88)

	HDR2	HDR2	HDR2
(DO 57)	31	(DO 73)	(DO 89)
(DO 58)	29	(DO 74)	(DO 90)
(DO 59)	27	(DO 75)	(DO 91)
(DO 60)	25	(DO 76)	(DO 92)
(DO 61)	23	(DO 77)	(DO 93)
(DO 62)	21	(DO 78)	(DO 94)
(DO 63)	19	(DO 79)	(DO 95)
(DO 64)	17	(DO 80)	(DO 96)
	50		

0V



Product Datasheet 24

Configuring & programming the USBDO96 card:

General overview:

This section gives a general overview of how the card works and the steps that are required to configure and command it. (For details on the text commands that are required to program the USBDO96 card, see the 'Command format' section on pages 4 & 5).

Please refer to the following 'Quick start guide' for information on downloading & installing the USB 'Virtual COM port' drivers for the USBDO96 card. Click on the following link or paste into your browser:

[Data Sheet 32 \(USB DAQ & Relay Card devices - Installation & Quickstart Guide\)](#)

Example programs (applications and library files) are available in a range of programming languages and are designed as 'basic building blocks' to allow you to get up and running quickly with the USBDO96 card: [Code Snippets](#)

This card uses a simple ASCII/Hex text command set (compatible with our entire range of USB/serial relay cards), however the requirements for initialising and activating/de-activating individual relays are different and require further explanation.

In general, this card is initialised and programmed as six individual groups, each group consisting of 16 relay relays, making 96 relays in total (6x16). Each group can be programmed in sub groups of 8.

This card uses our DO24 PIC chip – it has four 8 bit ports:

Port A (not programmable – it is used for communications functions)

Port B: Bits B0 to B7 (this is used for initialisation and data latching functions)

Port C: Bit C0 to C7 (this is used for the lower 8 bits of each 16 bit relay group)

Port D: Bit D0 to D7 (this is used for the upper 8 bits of each 16 bit relay group)

Port B functions:

Bit B0: This bit is used to enable the other 7 bits of port after they have been configured/ programmed. It is gated with anti 'power on glitch' circuitry, designed to ensure that the card can always be initialised and configured prior to enabling each group of 16 (this avoids a potential random power on status – provided each group of 16 has been correctly initialised as per our example programs). Bits B1 to B7, C0 to C7 and D0 to D7 should all be set to logic 0 before this bit (B0) is set to logic 1 (i.e. enable). This will ensure that all digital output channels/relays are set to logic 0 after initialisation.

Bit B1: Data Latch signal for digital outputs DO1 to DO16 (Group 1). (Data Bits C0 to C7 and D0 to D7 will be latched by this signal changing from logic 0 to logic 1). Bit B0 must also be set to logic 1 (enable).

Bit B2: Data Latch signal for digital outputs DO17 to DO32 (Group 2). (Data Bits C0 to C7 and D0 to D7 will be latched by this signal changing from logic 0 to logic 1). Bit B0 must also be set to logic 1 (enable).

Bit B3: Data Latch signal for digital outputs DO33 to DO48 (Group 3). (Data Bits C0 to C7 and D0 to D7 will be latched by this signal changing from logic 0 to logic 1). Bit B0 must also be set to logic 1 (enable).

Bit B4: Data Latch signal for digital outputs DO49 to DO64 (Group 4). (Data Bits C0 to C7 and D0 to D7 will be latched by this signal changing from logic 0 to logic 1). Bit B0 must also be set to logic 1 (enable).

Product Datasheet 24

Bit B5: Data Latch signal for digital outputs DO65 to DO80 (Group 5). (Data Bits C0 to C7 and D0 to D7 will be latched by this signal changing from logic 0 to logic 1). Bit B0 must also be set to logic 1 (enable).

Bit B6: Data Latch signal for digital outputs DO81 to DO96 (Group 6). (Data Bits C0 to C7 and D0 to D7 will be latched by this signal changing from logic 0 to logic 1). Bit B0 must also be set to logic 1 (enable).

Note: Each group of 16 channels must be programmed individually (six groups of 16), they cannot be programmed simultaneously (i.e. 96 channels at the same time). However, it is possible to configure all 96 channels in a few 10's of milliseconds.

After setting each port B bit (B1 to B7) to a logic 1 (i.e. latching the status of each group of 16), each bit is then set to a logic 0. (The data latching function only occurs on a positive going transition of each bit (i.e. logic 0 to logic 1).

A typical initialisation & command sequence is as follows:

ASCII 'B' (42H), 00H: ASCII 'E' (45H), 00H: ASCII 'H' (48H), 0H	Sets direction of ports B, C & D as outputs
ASCII 'C' (43H), 00H: ASCII 'F' (46H), 00H, ASCII 'J' (4AH), 00H	Initialises Ports B, C & D at 00H (i.e. no channels/relays activated)
ASCII 'C' (43H), FFH: ASCII 'F' (46H), 00H, ASCII 'J' (4AH), 00H	Writes 00H to Ports B, C & D (Port B LSB (Least Significant Bit) is the group enable bit – latches data 00H to ports C & D)
ASCII 'C' (43H), 01H: ASCII 'F' (46H), 00H, ASCII 'J' (4AH), 00H	Writes 01H to Port B & 00H to Ports C & D (returns latch signal to logic 0 - signals are only set on the logic 0 to logic 1 transition)
ASCII 'C' (43H), 02H: ASCII 'F' (46H), 01H, ASCII 'J' (4AH), 00H	Sets the first channel of the first group (DO1) to logic 1 (active)

Serial Port settings

Baud rate: 9600
 Parity: 0
 Data: 8 bits
 Stop bits: 1
 Handshaking: None

Auto detection & com port assignment

When you connect this card to a USB port of your computer for the first time, it will be auto-detected and ask you to install drivers (downloadable from the 'downloads' section of our website). After installation, the card will appear as a 'virtual' COM port and be automatically assigned the next available COM port. Following installation, the COM port number can be manually re-assigned via the control panel if required. Following reboots or disconnects of the USB card, the same COM port number will be assigned to the unique serial number of this card.

Command format

The card is initialised & commanded by sending a single ASCII character followed by a hex number (representing the required port status). The commands address each 8 bit DIO port of the PIC device. (ASCII character Hex equivalent is shown in brackets). You must first set the port direction (as either input or output). If a channel is set as an input, your software must send a read command (of that channel) followed by a read of the serial port. You should allow approx 10mS between successive commands.

Product Datasheet 24

Port B (Bits 0-7), C (Bits 8-15) & D (Bits 16-23) commands:

Note: The USBDO96 card is an output only card – it cannot be used in input/read mode.

ASCII 'B' (42H), 0H Initialises the card (sets the port & channel I/O directions). Set direction of Port B, 1=Input, 0= output. (i.e. where 0H sets bits 0-7 as outputs).

ASCII 'C' (43H), X Write data X to Port B (i.e. X=00000001 (01H), sets channel 1 to active). Valid data bytes are latched by the card until a further valid data byte is written to it.

ASCII 'E' (45H), 0H Initialises the card (sets the port & channel I/O directions). Set direction of Port C

ASCII 'F' (46H), X Write data X to Port C (i.e. X=00000001 (01H), sets channel 1 to active).

ASCII 'H' (48H), 0H Initialises the card (sets the port & channel I/O directions). Set direction of Port D

ASCII 'J' (4AH), X Write data X to Port D (i.e. X=00000001 (01H), sets channel 1 to active).

Using Windows HyperTerminal

In order to test operation, the card can be connected (using the 'virtual COM'/serial port and controlled from Windows HyperTerminal. Ensure port configuration is set as shown above, type (ASCII/Hex) characters shown above to achieve port direction and read or write command/data.

Example downloads

Example driver files and executables are available from the 'downloads' area of our website (www.easydaq.co.uk). Example programs for our USB relay & DIO cards are currently available for LabView, Visual Basic, Visual C, C#, JAVA, Agilent VEE & Delphi.

Uses existing USB & serial port software examples

This card uses the same software drivers & command interface that is used in our existing range of USB/Serial port relay & DIO card products. Therefore, if you have already used our USB or serial port products on a previous project, you can re-use some or all of your code (or switch to using a USB relay card instead of a serial port card).

If you are a Linux user, please refer to this web link for additional information and low level details on how to address and command our USB/serial relay & DIO cards:

[Data Sheet 34 \(Using Linux with EasyDAQ USB Products\)](#)





Product Datasheet 24

Document versions

Version number	Date	Notes
1.0	26 th November 2005	First release
1.1	2 nd April 2018	Updated to links to EasyDAQ.co.uk
1.2	17 th November 2021	This version. Corrected "J" = ASCII 0x4A (Not "K"). Various typing errors corrected.