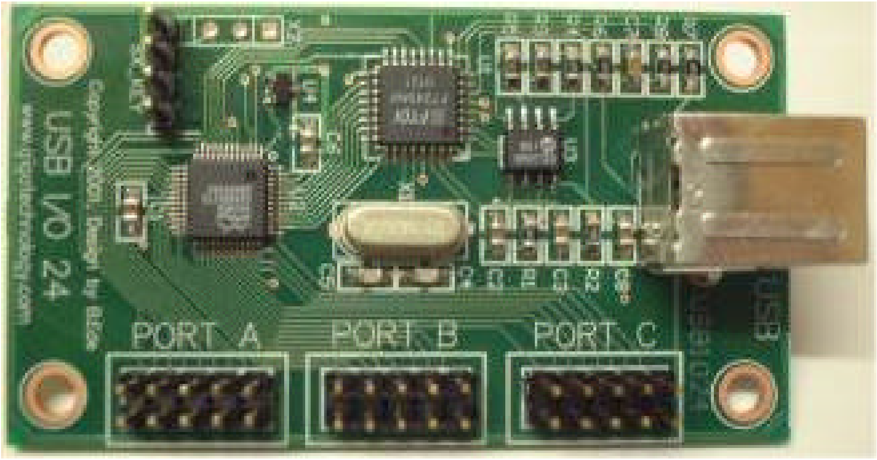
USBIO24 Digital I/O Module

The USBIO24 is a low-cost integrated module for the input and/or output of digital signals from a computer system by connection to the USB port. The module features 24 5V level signal lines individually programmable as input or output. As the module connects to the USB port, multiple modules can be connected to a single PC by the use of a USB hub or hubs. Each module features a serial number and the PC can identify each module uniquely allowing for multiple modules to be connected for a single application. The outputs of the module are able to source or sink up to 30mA per I/O to allow for direct connection to a variety of devices.

The USB I/O 24 Module



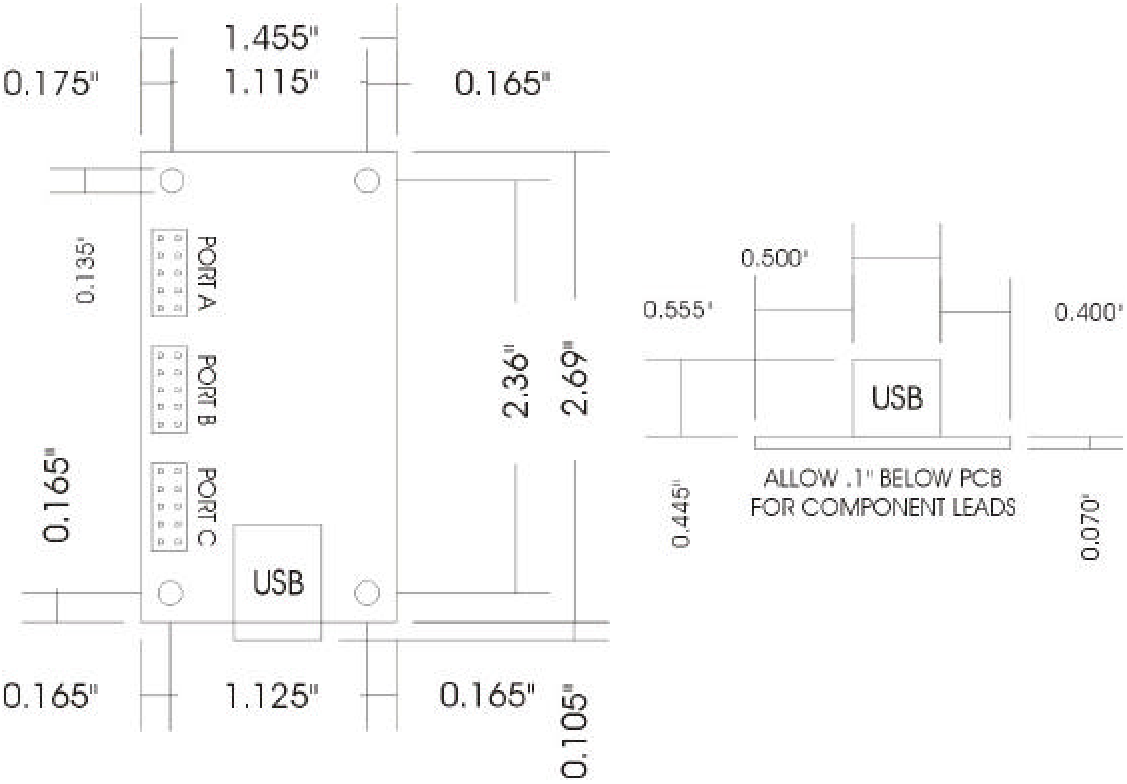
MODULE FEATURES

- 24 independently programmable Input / Output Pins Grouped into 3 ports.
- Single module High-Speed Digital Input / Output solution.
- Up to 128 modules can be connected to a single PC.
- Easy to connect by 0.1” pitch headers to suit standard IDC connectors.
- Integrated Type-B USB Connector.
- On-board unique serial number in EEPROM and custom programmable FLASH microcontroller.
- Both USB Enumeration information and Microcontroller can be re-programmed to suit customer needs.
- Module powered by the USB from the PC.

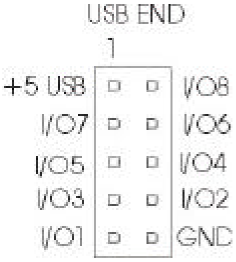
Module Standard Firmware & Software

- Virtual Comm Port driver allows access as a regular serial port.
- Optional DLL based driver available.
- Easy to program from popular languages C, Basic, Delphi, etc.
- Simple command set for easy control of ports and data transfer.

Module Layout and Physical Dimensions



Port Connector Pinout



USB I/O 24 I/O Connector

All 3 ports

PIN #	SIGNAL	TYPE	DESCRIPTION
1	VCC	PWR	+5V from USB BUS – May be used to supply your circuitry up to the maximum of 50mA
2	I/O8	I/O	Programmable I/O pin with bit value of 128
3	I/O7	I/O	Programmable I/O pin with bit value of 64
4	I/O6	I/O	Programmable I/O pin with bit value of 32
5	I/O5	I/O	Programmable I/O pin with bit value of 16
6	I/O4	I/O	Programmable I/O pin with bit value of 8
7	I/O3	I/O	Programmable I/O pin with bit value of 4
8	I/O2	I/O	Programmable I/O pin with bit value of 2
9	I/O1	I/O	Programmable I/O pin with bit value of 1
10	GND	PWR	Ground signal USB BUS and all I/O

Communication Protocol (Standard Firmware Only)

COMMAND	DATA	FUNCTION
‘?’	Responds ‘USB I/O 24’	Identify Device
‘A’	1 Byte Port Data	Write to Port A
‘B’	1 Byte Port Data	Write to Port B
‘C’	1 Byte Port Data	Write to Port C
‘a’	Responds with 1 Byte Port Data	Read from Port A
‘b’	Responds with 1 Byte Port Data	Read from Port B
‘c’	Responds with 1 Byte Port Data	Read from Port C
‘!A’	1 Byte Port I/O Data	Write to Port A Direction Register
‘!B’	1 Byte Port I/O Data	Write to Port B Direction Register
‘!C’	1 Byte Port I/O Data	Write to Port C Direction Register

The commands in the above table are in ASCII format.
All Data is sent in Binary format.

Absolute Maximum Ratings

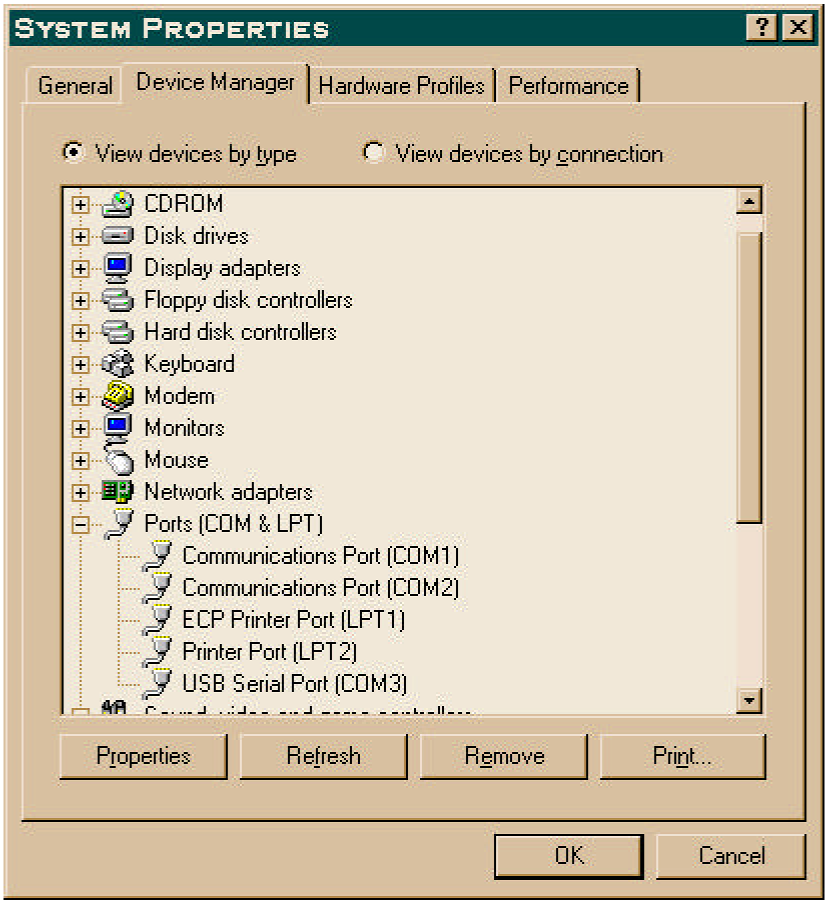
Subjecting the device to conditions outside these rating will invalidate the product warranty and may cause irreparable damage the device.

Maximum Voltage on Any Pin (referenced to GND)	5.1 V DC
Minimum Voltage on Any Pin (referenced to GND)	-0.1V DC
Total Current to or from Any I/O Pin	30mA
Total Current in or out of the module’s I/O pins	200mA

Driver Installation.

Your first choice when using the USBIO24 is whether you want to use the Virtual Com Port driver or the Direct DLL driver.

For programming simplicity the best driver is the Virtual Com Port and when installed the USBIO24 will appear in the System Properties / Device Manager as an USB Serial Port (COMn) as follows.



● View devices by type ○ View devices by connection

The Com port number will vary depending on the number of existing com ports on your computer and the number of USBIO24s or USBMODs connected to your system.

To install the Virtual Com Port drivers, download the driver from our website or the ftdichip.com website and unzip the files to a local directory. Then connect the USBIO24 and windows will automatically ask for the driver, select to specify a location and browse to the directory where you have unzipped the files. (Use of the Non Plug & Play driver for the USBIO24 is recommended to avoid a delay on connecting the USBIO24)

Once the Virtual Com Port is installed it can be programmed exactly as a regular serial com port using the MSComm control from within VB or API calls from C or other languages. Set the com port to the same number as appears in the Device Manager, the baud rate, stop bits, parity etc are not used as the device always runs at full speed.

The Direct DLL driver is installed in a similar manner but using the alternative download from the website.

Programming the Direct DLL driver is by call to the DLL Library functions.
Please download the Direct DLL programmers guide from the FTDI website.

Programmers Reference Documentation

Programming the USBIO24 from Visual Basic using the Virtual Comm Port.

To operate the USBIO24 from within Visual Basic it’s best to use the Microsoft MSComm control to access the com port. To input data from the USBIO24 you must use the port in binary mode and receiving the data is a bit convoluted.

Opening the Port

As the USBIO24 unit uses binary data transfer we must use the port in binary mode.
If the port number is incorrect or the USBIO24 module is not connected then VB will generate an error.

```
MSComm1.CommPort = 3 ‘ Set this number as shown in the Device Manager
MSComm1.InputMode = comInputModeBinary ‘ Set Binary Input Mode
MSComm1.PortOpen = True ‘ Open the Port
```

Setting the pins as Inputs or Outputs

Setting the Ports as Input or Output you must determine the value for the pins you want set as inputs.
To set pins I/O1, I/O2 and I/O3 as inputs and the remaining pins as outputs you simply add the bit values of the input pins 1 + 2 + 4 = 7 and thus the value to be placed in the IOValx variable in the following example code is 7.

```
‘ Set I/O1, I/O2 & I/O3 of port A to inputs and the rest as outputs.

IOValA = 7 ‘ First 3 inputs all the rest as outputs
IOValB = 0 ‘ All outputs
IOValC = 0 ‘ All outputs
MSComm1.Output = "!A" + Chr$(IOValA) ' Write to Port A Direction Register
MSComm1.Output = "!B" + Chr$(IOValB) ' Write to Port B Direction Register
MSComm1.Output = "!C" + Chr$(IOValC) ' Write to Port C Direction Register
```

Writing to the Ports

To write to the Output Pins simple repeat the Above without the ! character.
The following example code sets the I/O8 pin on port B to high and the remaining pins as low.

```
IOValB = 128 ‘ I/O8 high, all the rest low
MSComm1.Output = "A" + Chr$(IOValB)
```

Reading from the Ports

To Read the Input Pins is a bit more complicated as we must request the data from the module, wait for it to arrive and then retrieve the data from the port. The following example reads the value from port A.

```
MSComm1.Output = "a" ‘ Request data from port A

T = Timer ‘ Use the Timer to allow the program to continue if there is an error
   While Timer < T + 0.4 And MSComm1.InBufferCount < 1
   Wend
If MSComm1.InBufferCount <> 1 Then
    Call MsgBox("Read Timeout", vbInformation, "USBIO24 Error")
    Exit Sub
    End If
Dim TempBuffer As Variant
Dim ByteBuffer() As Byte
TempBuffer = MSComm1.Input
ByteBuffer = TempBuffer
PortAVal = ByteBuffer(0)
```

Further Reading and Examples

More information and examples for the USBIO24 can be found on our websites at www.ravar.net or www.gigatechnology.com
Updated drivers and further information about the USB interface chip can be found at the FTDI website www.ftdichip.com
Information about the SX48 microcontroller can be found on the UBICOM website at www.ubicom.com

Technical Support and Further Information

For any questions relating to the USBIO24 please contact us by Email, Fax or Phone.

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Product Use Limitations, Warranty and Quality Statement.

The USBIO24 should not be used in any situation where it's failure or failure of the PC or software controlling it could cause human injury or severe damage to equipment.
This device is not designed for or intended to be used in any life critical application.

The USBIO24 is warranted to be free from manufacture defects for a period of 12 months from the date purchase.
Subjecting the device to conditions beyond the Absolute Maximum Ratings listed above will invalidate this warranty.
The USBIO24 is a static sensitive device, anti static procedures should be used in the handling of this device.

All USBIO24 units are extensively tested at time of manufacture to be free of defects.

Ravar is committed to providing products of the highest quality. Should you experience any product quality issues with this product please contact our quality assurance manager at the above address.

Disclaimer.

This product and its documentation are provided as-is and no warranty is made or implied as to their suitability for any particular purpose.
Ravar Pty Ltd will not accept any claim for damages arising from the use of this product or documentation.
This document provides information on our products and all efforts are made to ensure the accuracy of the information contained within. The specifications of the product are subject to change and continual improvement.