FEATURES
- 24 lines of digital I/O
- High-speed USB 2.0 device, USB 3.0 and 1.1 compatible
- Two 8-bit & two 4-bit ports each software configurable for input or output
- Field selectable CMOS (+5V) or LVTTL (3.3V) Vccio signal levels
- CMOS: All 24 I/O lines buffered with 32 mA sink and source
- LVTTL: All 24 I/O lines buffered with 24 mA sink and source
- Two 82C54 counters with all pins available at I/O connector
- Each port field configurable with pull-up, pull-down, or no-bias
- Powered via USB cable; optional external power supply for sourcing
- Higher total current
- Vccio at connector for general purpose use, protected by polyfuse
- Standard 50 pin male IDC header compatible with Industry-Standard I/O
- Rugged, steel, industrial enclosure (4 by 4 by 1.2 inches)
- OEM (board only) version for embedded applications
- Screw Terminal for external power connection
- Extended operating temperature -40 to +85°C
- This product is available in a RoHS compliant version

FACTORY OPTIONS
- External power for higher source current capabilities
- Standard 50 pin male IDC header compatible with industry-standard I/O
- Racks such as Gordos, OPTO22, Potter & Brumfield
- PC/104 size (3.550 by 3.775 inches)
- Rugged, steel, industrial enclosure (4 by 4 by 1.25 inches)

FUNCTIONAL DESCRIPTION
The board features 24 bits of CMOS/LVTTL-compatible digital I/O with high-current capabilities and two 82C54 counter/timers. Each digital port can be programmed to accept inputs or to drive outputs. Groups of two 8-bit ports and two 4-bit ports are designated as port A, B, CHi and CLo. Power is supplied to the card via the USB cable. For higher current sourcing capabilities, external power may be used. The I/O wiring connections are via an industry standard 50-pin male connector any of our optional terminal block cards. For external circuits, fused +5V (or 3.3V) DC power is available on pin 49 of the connector. The resettable fuse is rated at 0.5A.

All 24 I/O lines are buffered by a type 74LVC8T245 tristate buffer transceiver capable of operating in CMOS (+5V) or LVTTL (+3.3V) modes. The mode is set for all pins simultaneously via an onboard jumper. When using CMOS mode the outputs can sink or source 32 mA. In LVTTL mode the outputs can sink or source 24mA. The 24 bits are divided into four ports: two 8-bit ports (Port A, Port B), and two 4-bit ports (Port CLo, Port CHi). Each port can be configured independently via onboard jumpers for pull-up, pull-down, or no bias. Each port can also be configured independently, via software command, for use as inputs or outputs.

The board is available in two models, one with two 8254 counter/timer chips, and one without. The unit without counters is optimally suited for use with industry standard solid state module mounting racks. Because this version does not place any counter signals on pins normally reserved for Ground, it provides a perfectly compatible 50-pin IDC connection.

OEM USB/104 FORM FACTOR
The OEM (board only) version is perfect for a variety of embedded applications. What makes the OEM option unique is that its PCB size and pre-drilled mounting holes match the PCI/104 form factor (without the bus connections). The board can be added to any PC/104, PCI-104, or PCI/104-Express stack by connecting it to a USB 2.0 port usually included on-board with embedded CPU form factors such as EBX, EPIC, and PC/104. The USB-DIO24-CTR6 and USB-DIO-24 OEM board can also be installed using standoffs inside other enclosures or systems. For embedded OEM type applications, an additional miniature USB header connector is provided in parallel with the type B connector.

ACCESSORIES
Optionally available accessories include a variety of screw terminal adapter cards and a DIN-Rail mounting adaptor model MP104-DIN. Also available is our low cost IIB-24 which will add optical isolation to any standard 24-channel digital input port on a 50 pin connector. To make use of the miniature embedded USB header connector for -OEM versions, we offer a type A to mini cable.

SOFTWARE
The module utilizes a high-speed custom function driver optimized for a maximum data throughput that is 50-100 times faster than the USB human interface device (HID) driver used by many competing products at 4000 transactions per second. This approach maximizes the full functionality of the hardware along with capitalizing the advantage of high-speed USB 2.0. The USB-DIO24-CTR6 is supported for use in most operating systems and includes a free Linux and Windows compatible software package, including OSX. This package contains sample programs and source code in Visual Basic, Delphi and Visual C++ for Windows. Also incorporated is a graphical setup program in Windows. Third party support includes a Windows standard DLL interface usable from the most popular application programs. Embedded OS support includes Windows XPe, and Windows Embedded Standard.
**BLOCK DIAGRAM**

**SPECIFICATIONS**

**Digital I/O**
- Channels / Groups: 24 in two 8-bit and two 4-bit groups
- Type: 8255 Mode 0 compatible
- Logic Level: Vccio, jumper selectable
- Pull-up/down: 10kΩ, jumper selectable

**Type**
- 8255 Mode 0 compatible

**Logic Level**
- Vccio

**Pull-up/down**
- 10kΩ, jumper selectable

**Vccio**
- 5V

**Counter / Timers**
- Number / Type: Two 82C54 programmable interval counters
- Counter size: 16-bit
- Logic level: Vccio
- On-board clock: 10MHz
- Clock Pulse Width: High - 30ns (min) Low - 40ns (min)

**Bus Type**
- USB 2.0 high-speed
- USB 3.0 and 1.1 compatible

**Environmental**
- Operating Temp.: 0°C to 70°C
- (-40 to +85°C available as a factory option)
- Storage Temp.: -40°C to +85°C
- Humidity: 5%-90% RH, non-condensing
- Board Dimension: 3.550 x 3.775 inches
- Box Dimension: 4.00 x 4.00 x 1.25 inches

**ORDERING GUIDE**
- **USB-DIO24-CTR6**
  - USB 24-channel digital input/output module with two 82C54’s, installed in rugged enclosure
- **USB-DIO-24**
  - USB 24-channel digital input/output module

**Model Options**
- **-PR**
  - Ext. regulated 5V power and AC/DC adapter
- **-ST**
  - External power connection via screw terminals
- **-OEM**
  - Board only (no enclosure or terminal board)
- **-RoHS**
  - Compliant board
- **-T**
  - Extended operating temp. -40°C to +85°C

**Optional Accessories**
- **UTBK-50**
  - Removable screw terminal board
- **STB-50**
  - Screw terminal board, requires ribbon cable
- **STB-50U**
  - Spring cage term bd. accepts 24 to 16 AWG wire
- **STB-50U Kit**
  - Terminal bd. kit mounts on I/O module enclosure
- **IIB-24**
  - 24-input channel optical isolator board
- **CAB50-6**
  - 6' flat ribbon cable female to edge connector
- **CAB50F-6**
  - 6' flat ribbon cable female to female connectors
- **MP164-DIN**
  - DIN rail mounting provision
- **CUSB-EMB-6**
  - 6' USB Cable with Type A to mini connector
- **CUSB-LOCK**
  - USB Locking Cable