

USB I/O CONTROL BOX

USB-I/O-8DRV

8 relays, 8 digital I/O lines and 8 HV inputs

The Big Deal

- 8 TTL/LVTTL digital I/O channels, 8 High Voltage digital inputs (32V max) and 8 electromechanical Form C buffered relays
- All TTL/LVTTL channels can sink & source 32mA
- All required power drawn from USB bus



Case Style: LE1594



Software Package

Applications

- Lab test equipment
- Automated test setups
- Control systems
- handling HV digital inputs

Included Accessories

Model No.	Description	Qty.
USB-CBL-AB-3+	2.7ft. USB cable	1
FCBL-10-1+	10 pin flat cable	1
FCBL-14-1+	14 pin flat cable	1
FCBL-34-1+	34 pin flat cable	1

RoHS Compliant

See our web site for RoHS Compliance methodologies and qualifications

Product Overview

Mini Circuits' USB-I/O-8DRV is a general purpose USB controlled I/O box which provides 8 form C relays with both outputs available as dry contacts and 16 digital channels. The digital channels are arranged in two bytes, one of High Voltage input only channels ('1' 4 to 32V) and the other of I/O channels selectable as either TTL or LVTTL. The digital I/O Byte must be toggled as a unit between input and output modes and can sink or source up to 80mA total (10mA per channel if all channels are active). With selective operation each channel can sink or source up to 32mA in TTL mode ('1' is 5V) or 24mA in LVTTL mode ('1' is 3.3V) - selection of TTL or LVTTL modes is done by means of an external switch. Each of the 8 relays can support an AC load of 125V_{AC} at 0.5A or DC load of 24V_{DC} at 1A.

Full software support is provided, including our user-friendly GUI application for Windows and a full API and programming instructions for both Windows and Linux environments (32-bit and 64-bit systems). The latest version of the full software package can be downloaded from <https://www.minicircuits.com/softwaredownload/usbio.html> at any time.

The control box draws all required power from the USB bus, no external power required. The device is housed in a small, rugged plastic case (size of 4.5" X 3.1" X 1.2") with easy connections. Each type of input/output line is accessed via a separate IDC type connector of a different size to help prevent confusion. Longer USB and IDC cables are available as additional accessories, see page 7 for details.

Key Features

Feature	Advantages
8 relays with dry contact Outputs	Can be used to operate up to 8 analog devices simultaneously, each with a draw of up to 125V _{AC} /0.5A or 24V _{DC} /1A . Each relay has two outputs, allowing them to be used to switch between two devices or to start/stop a single device. Current draw per relay 30mA typical
Monitors 8 digital high voltage inputs	The USB-I/O-8DRV design allows it to monitor digital inputs at high voltage ('1' 4 to 32V) and convert them to USB signals for processing by a PC or other work station.
8 digital I/O outputs selectable TTL or LVTTL	Allows controlling TTL or LVTTL devices, any output can sink or source up to 32mA at TTL or 24mA at LVTTL so long as the total current through all channels remains below 80mA.
USB HID (Human Interface Device)	Plug-and-Play (no need to install a driver for the device).

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Rev. C
M169105
EDR-10282
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RAV
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Electrical Specifications

Parameter	Connectors	Conditions	Min.	Typ.	Max.	Units
DIGITAL I/O	10 pin horizontal IDC header. See table on page 3 for details.	8 I/O logic '1' levels (selectable) ¹	3.3	–	5	V
Digital Input (8 lines, TTL/LVTTL selectable '1'=5V when indicator Green or '1'=3.3V when indicator Red) ¹						
Logic high	10 pin horizontal IDC header. See table on page 3 for details.	TTL mode	V _{USB} x0.7	–	5.0	V
		LVTTL mode	2.0	–	3.3	
Logic Low		TTL and LVTTL modes	0	–	0.8	
Current sink		TTL, Current through a single line ²	–	–	32	mA
		LVTTL, Current through a single line ²	–	–	24	
Digital Output (8 lines, TTL/LVTTL selectable '1'=5V when indicator Green or '1'=3.3V when indicator Red) ¹						
Logic high	10 pin horizontal IDC header. See table on page 3 for details.	TTL mode	3.8	–	–	V
		LVTTL mode	2.4	–	–	
Logic Low		TTL and LVTTL modes	0	–	0.6	
Current source		TTL, Current through a single line ²	–	–	32	mA
		LVTTL, Current through a single line ²	–	–	24	
Relay Outputs (Contact arrangement: SPDT, form C)						
DC load	34 pin horizontal IDC header. See table on page 3 for details.	@24V	–	–	1	A
AC Load		@125V	–	–	0.5	
Relay On (each relay)		@5V		30		mA
Contact resistance		Relays closed	–	–	0.1	Ω
Operation Life		Mechanical.	5 Million	–	–	operations
Operating time			–	–	10	msec
Release time			–	–	8	msec
Operating frequency	Electrical (under load)	–	–	1,800	Operations / hour	
	Mechanical	–	–	36,000		
High Voltage Digital inputs						
Logic high	14 pin horizontal IDC header. See table on page 3 for details.	Falls on Internal 7.5KΩ resistor	4	–	32	V
Logic low			0	–	1	
Current sink		@32V	–	–	5	mA
BUS Type	USB 2.0					
V _{USB}	USB	Current up to 500mA	4.5	5.0	5.5	V
Current Draw from USB bus		No relays or digital lines active.	–	60	–	mA
		All 8 Relays are active, no digital lines active	–	300	–	
		All 8 Relays are active, digital lines drawing max. current.	–	380	–	

¹ Switching between TTL and LVTTL modes is performed by means of an external switch. Switching between input and output modes is a software function.

² Total current sink / source through all lines in the byte may not exceed 80mA

Electrical Specifications (Continued)

Absolute Maximum Ratings

Parameter	Ratings
Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 60°C
Max Voltage on Relay contacts	36V _{DC} or 185V _{AC}
V _{IN} on digital lines @ Output TTL mode	-0.5V _{DC} to 5.5V _{DC}
V _{IN} on digital lines @ Output LVTTTL mode	-0.5V _{DC} to 3.8V _{DC}
V _{IN} on digital lines @ Input TTL mode	-0.5V _{DC} to 6.5V _{DC}
V _{IN} on digital lines @ Input LVTTTL mode	
Sink/Source current for entire Byte	95mA
Sink/Source current for single channel	45mA
V _{IN} on High Voltage digital inputs	40 V _{DC}
Sink current for high voltage digital inputs	5 mA

Permanent damage may occur if any of these limits are exceeded.

Connections

Relays*	(34 pin IDC connector)
TTL/LVTTTL**	(10 pin IDC connector)
HV Digital input#	(14 pin IDC connector)
USB Port	(USB B female)

* 34 Pin IDC connector pin connections (Relays)

Relay	Common	Normally Open (N _O)	Normally Closed (N _C)
Relay 1	1	2	3
Relay 2	4	5	6
Relay 3	7	8	9
Relay 4	10	11	12
Relay 5	13	14	15
Relay 6	16	17	18
Relay 7	19	20	21
Relay 8	22	23	24
GND	29-34		
Not connected	25-28		

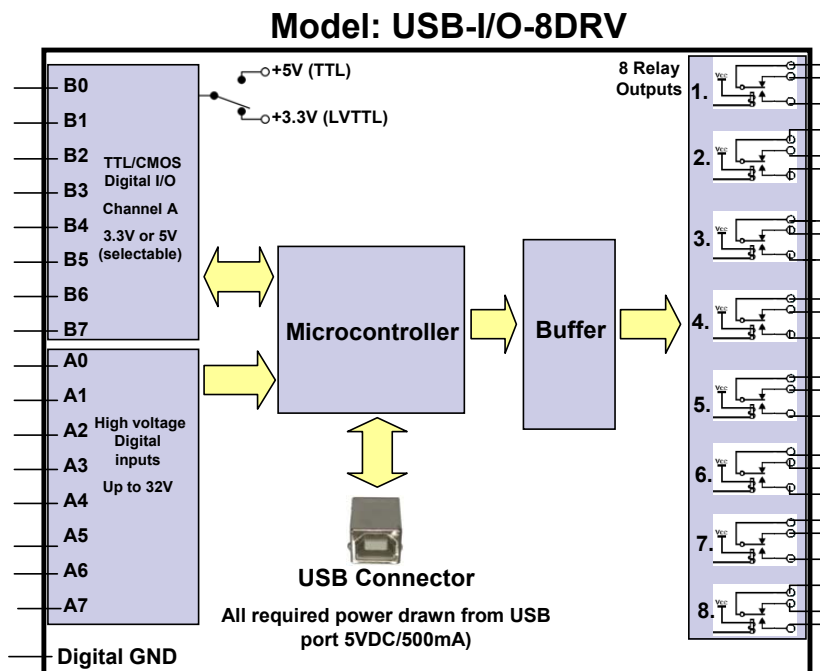
#14 Pin IDC connector pin connections (high voltage)

PIN Number	Function
1	HV digital input (A0)
2	HV digital input (A1)
3	HV digital input (A2)
4	HV digital input (A3)
5	HV digital input (A4)
6	HV digital input (A5)
7	HV digital input (A6)
8	HV digital input (A7)
11-14	GND
9,10	Not connected

** 10 Pin IDC connector pin connections (TTL/LVTTTL)

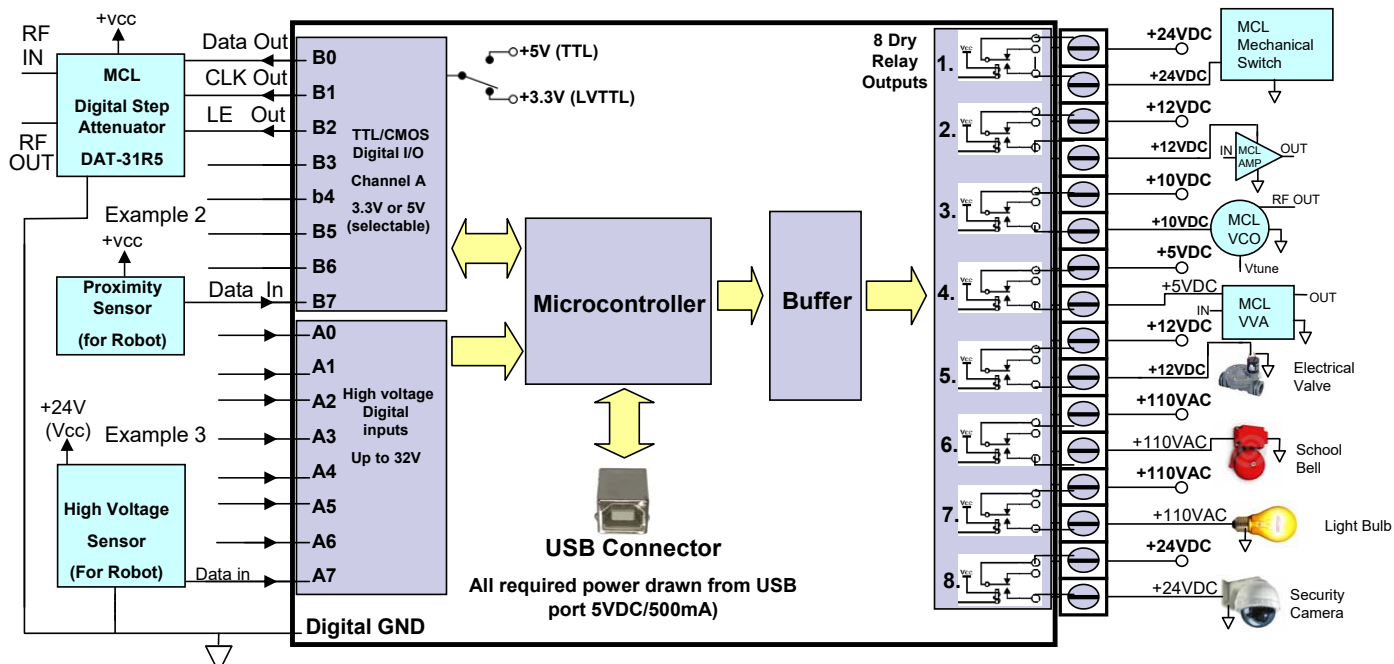
PIN Number	Function
1	TTL/LVTTTL I/O (B0)
2	TTL/LVTTTL I/O (B1)
3	TTL/LVTTTL I/O (B2)
4	TTL/LVTTTL I/O (B3)
5	TTL/LVTTTL I/O (B4)
6	TTL/LVTTTL I/O (B5)
7	TTL/LVTTTL I/O (B6)
8	TTL/LVTTTL I/O (B7)
9,10	GND

Simplified diagram

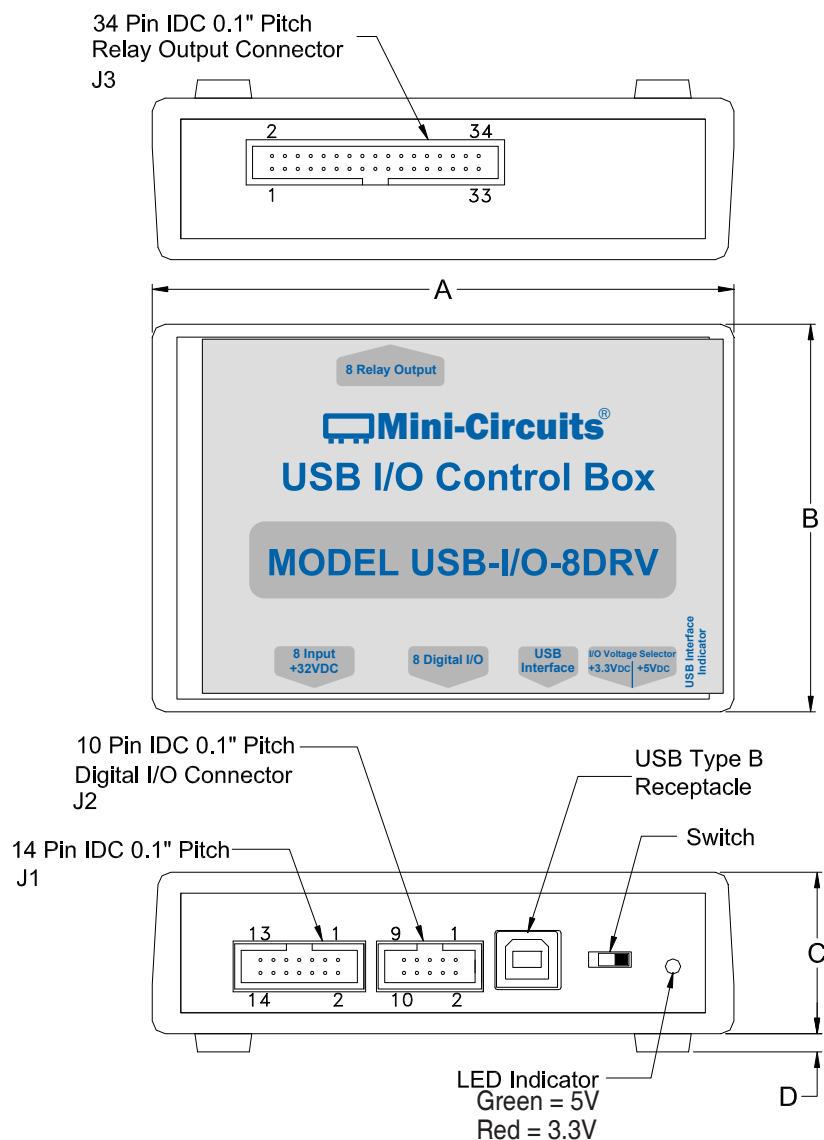


Application examples

Example 1



Outline Drawing: (LE1594)



Outline Dimensions ($\frac{\text{inch}}{\text{mm}}$)

A	B	C	D	WT. GRAMS
4.50 114.3	3.00 76.2	1.25 31.8	0.14 3.6	150

Software & Documentation Download:

- Mini-Circuits' full software and support package including user guide, Windows GUI, DLL files, programming manual and examples can be downloaded free of charge from <https://www.minicircuits.com/softwaredownload/usbio.html>
- Please contact testsolutions@minicircuits.com for support

Minimum System Requirements

Parameter	Requirements	
Interface	USB HID	
System requirements	GUI:	Windows 32 & 64 bit systems from Windows 98 up to Windows 10
	USB API (ActiveX & .Net)	Windows 32 & 64 bit systems with ActiveX or .Net support from Windows 98 up to Windows 10
	USB direct programming support	Linux, Windows systems from Windows 98 up to Windows 10
Hardware	Pentium® II or better	

Graphical User Interface (GUI) for Windows

Key Features:

- Set relay status
- Set digital input/output mode for each byte.
- Read signals at digital inputs.
- Set state of digital outputs.
- Configure three of the digital outputs as SPI.
- Send SPI words

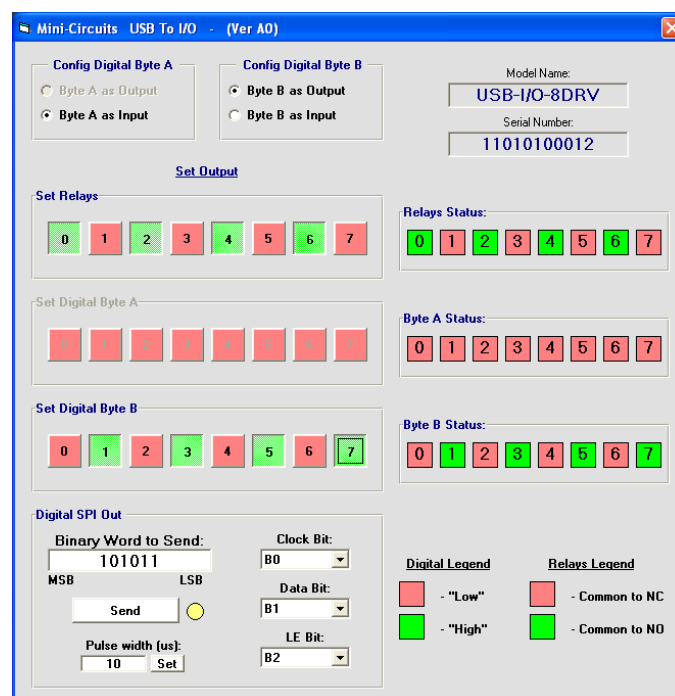
Application Programming Interface (API)

Windows Support:

- API DLL files exposing the full power sensor functionality
 - ActiveX COM DLL file for creation of 32-bit programs
 - .Net library DLL file for creation of 32 / 64-bit programs
- Supported by most common programming environments (refer to application note [AN-49-001](#) for summary of tested environments)





Linux Support:

- Full power sensor control in a Linux environment is achieved by way of USB interrupt commands.



Ordering, Pricing & Availability Information see our web site

Model	Description
USB-I/O-8DRV	USB I/O Control Box

Included Accessories	Part No.	Description
	USB-CBL-AB-3+	2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)
	FCBL-10-1+	1 ft (0.3 m) 10 pin cable assembly with IDC conn.
	FCBL-14-1+	1 ft (0.3 m) 14 pin cable assembly with IDC conn.
	FCBL-34-1+	1 ft (0.3 m) 34 pin cable assembly with IDC conn.

Optional Accessories	Description
USB-CBL-AB-3+ (Spare)	2.7 ft (0.8 m) USB cable
USB-CBL-AB-7+	6.8 ft (2.1 m) USB cable
USB-CBL-AB-11+	11 ft (3.4 m) USB cable
FCBL-10-1+ (Spare)	1 ft (0.3 m) 10 pin cable assembly with IDC conn.
FCBL-10-2+	2 ft (0.6 m) 10 pin cable assembly with IDC conn.
FCBL-10-3+	3 ft (0.9 m) 10 pin cable assembly with IDC conn.
FCBL-14-1+ (Spare)	1 ft (0.3 m) 14 pin cable assembly with IDC conn.
FCBL-14-2+	2 ft (0.6 m) 14 pin cable assembly with IDC conn.
FCBL-14-3+	3 ft (0.9 m) 14 pin cable assembly with IDC conn.
FCBL-34-1+ (Spare)	1 ft (0.3 m) 34 pin cable assembly with IDC conn.
FCBL-34-2+	2 ft (0.6 m) 34 pin cable assembly with IDC conn.
FCBL-34-3+	3 ft (0.9 m) 34 pin cable assembly with IDC conn.

Additional Notes

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp

