

# USB I/O CONTROL BOX

## USB-I/O-16D8R

8 form C relays and 16 digital I/O channels

### The Big Deal

- 16 (2 Bytes x 8 channels) TTL/LVTTL digital I/O lines and 8 electromechanical Form C buffered relays
- All digital I/O channels can sink & source 32mA
- All required power drawn from USB bus



Case Style: LE1562



### Applications

- Lab test equipment
- Automated test setups
- Control systems

Model No.	Description	Included Accessories	Software Package	Qty.
USB-CBL-AB-3+	2.7 ft. USB cable			1
FCBL-26-1+	26 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-16D8R is a general purpose USB controlled I/O box which provides 16 digital I/O lines arranged in 2 Bytes of 8 channels each, and 8 form C relays with dry contact outputs. Each digital I/O byte can operate as Input or Output independently of the other 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 between TTL and LVTTL is through an external switch. The supplied software allows either USB to SPI conversion or direct control of bit states.

All digital I/O channels are accessed through a single 26 pin IDC type connector and the relay outputs are accessed through a 34 pin IDC type connector. The relay outputs support an AC load of 125V<sub>AC</sub> at 0.5A or DC load of 24V<sub>DC</sub> at 1A and use approximately 25mA each when in operation.

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 is powered via USB, 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 that make it a superior choice for applications such as mobile, robotics, test setups, etc. Longer USB and IDC cables are available as additional accessories, see page 7 for details.

### Key Features

Feature	Advantages
16 TTL channels in 2 Bytes of 8 channels each	Allows controlling and monitoring up to 16 TTL or LVTTL devices, any channel can sink or source up to 32mA at TTL or 24mA at LVTTL so long as the total current through all channels in a given byte remains below 80mA.
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 <sub>AC</sub> /0.5A or 24V <sub>DC</sub> /1A. Each relay has two outputs, allowing them to be used to switch between two devices or to start/stop a single device.
Selectable TTL voltage	The USB-I/O-16D8R design allows to select the TTL voltage level as either 3.3V '1' (LVTTL) or 5V '1' (Standard TTL).
USB HID (Human Interface Device)	Plug-and-Play (no need to install a driver for the device).

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USB-I/O-16D8R  
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## Electrical Specifications

Parameter	Connectors	Conditions	Min.	Typ.	Max.	Units
DIGITAL I/O	26 pin horizontal IDC header. See table on page 3 for details.	16 I/O logic '1' levels (selectable) <sup>1</sup>	3.3	-	5	V
<b>Digital Input (2 Bytes x 8 channels each, TTL/LVTTL selectable '1'=5V when indicator Red or '1'=3.3V when indicator Green)<sup>2</sup></b>						
Logic high	26 pin horizontal IDC header. See table on page 3 for details.	TTL mode	$V_{USB} \times 0.7$	-	5.0	V
		LVTTL mode	2.0	-	3.3	
Logic Low		TTL and LVTTL modes	0	-	0.8	mA
Current sink		TTL, Current through a single line <sup>2</sup>	-	-	32	
	LVTTL, Current through a single line <sup>2</sup>	-	-	24		
<b>Digital Output (2 Bytes x 8 channels each, TTL/LVTTL selectable '1'=5V when indicator Red or '1'=3.3V when indicator Green)<sup>1</sup></b>						
Logic high	26 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	mA
Current source		TTL, Current through a single line <sup>2</sup>	-	-	32	
	LVTTL, Current through a single line <sup>2</sup>	-	-	24		
<b>Relay Outputs (Contact arrangement: SPDT, form C)</b>						
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	-	25	-	mA
Contact resistance		Relays closed	-	-	0.1	$\Omega$
Life		Mechanical.	5 Million	-	-	operations
Operate time			-	7	10	msec
Release time			-	4	8	msec
Operating frequency		Electrical (under load)		-	-	1,800
	Mechanical		-	-	36,000	
<b>BUS Type</b>	<b>USB 2.0</b>					
$V_{USB}$	USB	Current up to 500mA	4.5	5.0	5.5	V
Current Draw from USB bus		No relays or digital lines active.	-	55	-	mA
		All 8 Relays are active, no digital lines active	-	280	-	
		All 8 Relays are active, both digital bytes drawing max. current.	-	440	-	

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

<sup>2</sup> Total current sink / source through all lines in a byte may not exceed 80mA

## Absolute Maximum Ratings

Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 60°C
Max Voltage on Relay contacts	36V <sub>DC</sub> or 185V <sub>AC</sub>
V <sub>IN</sub> on digital lines @ Output TTL mode	-0.5V <sub>DC</sub> to 5.5V <sub>DC</sub>
V <sub>IN</sub> on digital lines @ Output LVTTTL mode	-0.5V <sub>DC</sub> to 3.8V <sub>DC</sub>
V <sub>IN</sub> on digital lines @ Input TTL mode	-0.5V <sub>DC</sub> to 6.5V <sub>DC</sub>
V <sub>IN</sub> on digital lines @ Input LVTTTL mode	
Sink/Source current for entire Byte	95mA
Sink/Source current for single channel	45mA

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

## Connections

Relays*	(34 pin IDC connector)
Digital I/O**	(26 pin IDC connector)
USB Port	(USB B female)

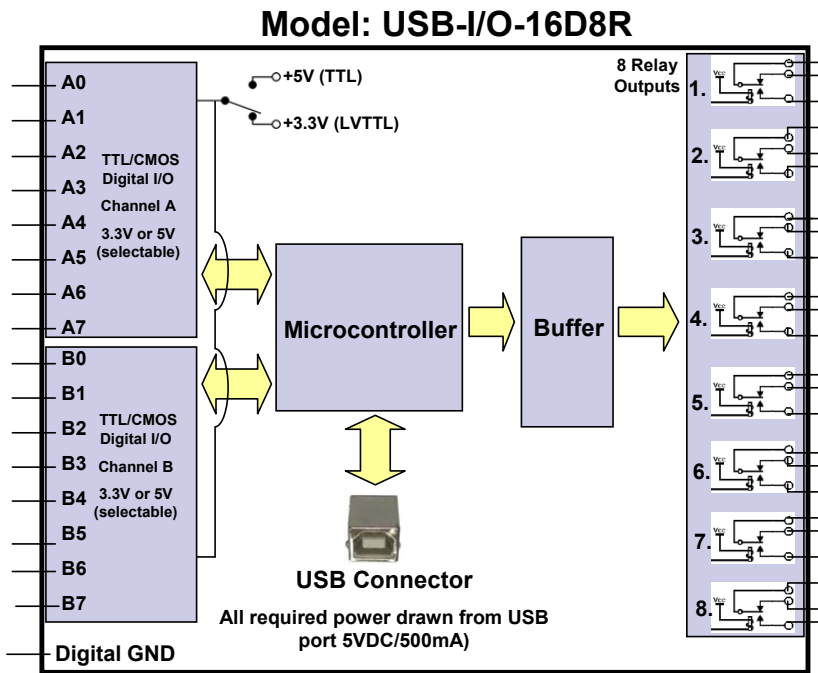
### \* 34 Pin IDC connector pin connections (Relays)

Relay	Common	Normally Open (N <sub>O</sub> )	Normally Closed (N <sub>C</sub> )
Relay 0	1	3	2
Relay 1	4	6	5
Relay 2	7	9	8
Relay 3	10	12	11
Relay 4	13	15	14
Relay 5	16	18	17
Relay 6	19	21	20
Relay 7	22	24	23
GND	29-34		
Not connected	25-28		

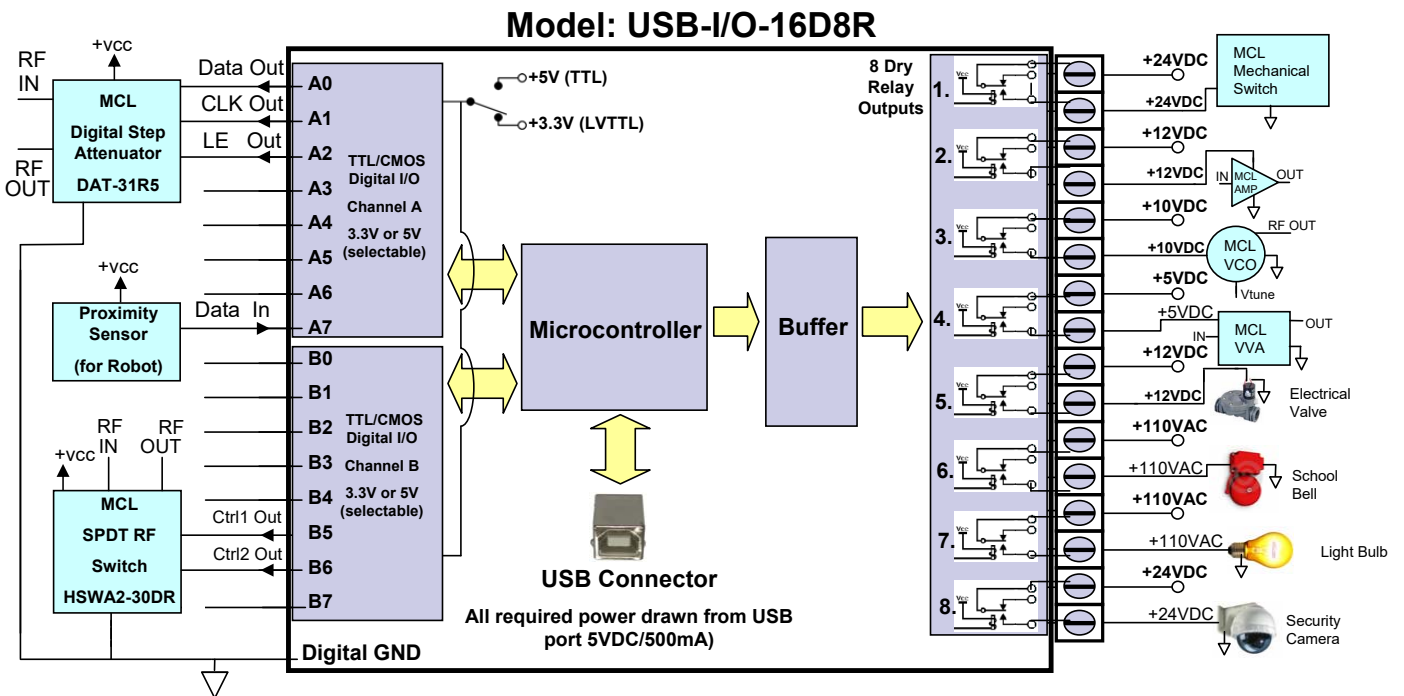
### \*\* 26 Pin IDC connector pin connections (Digital I/O)

Pin Number	Function
1	B0
2	B1
3	B2
4	B3
5	B4
6	B5
7	B6
8	B7
9	A0
10	A1
11	A2
12	A3
13	A4
14	A5
15	A6
16	A7
19-26	GND
17-18	Not connected

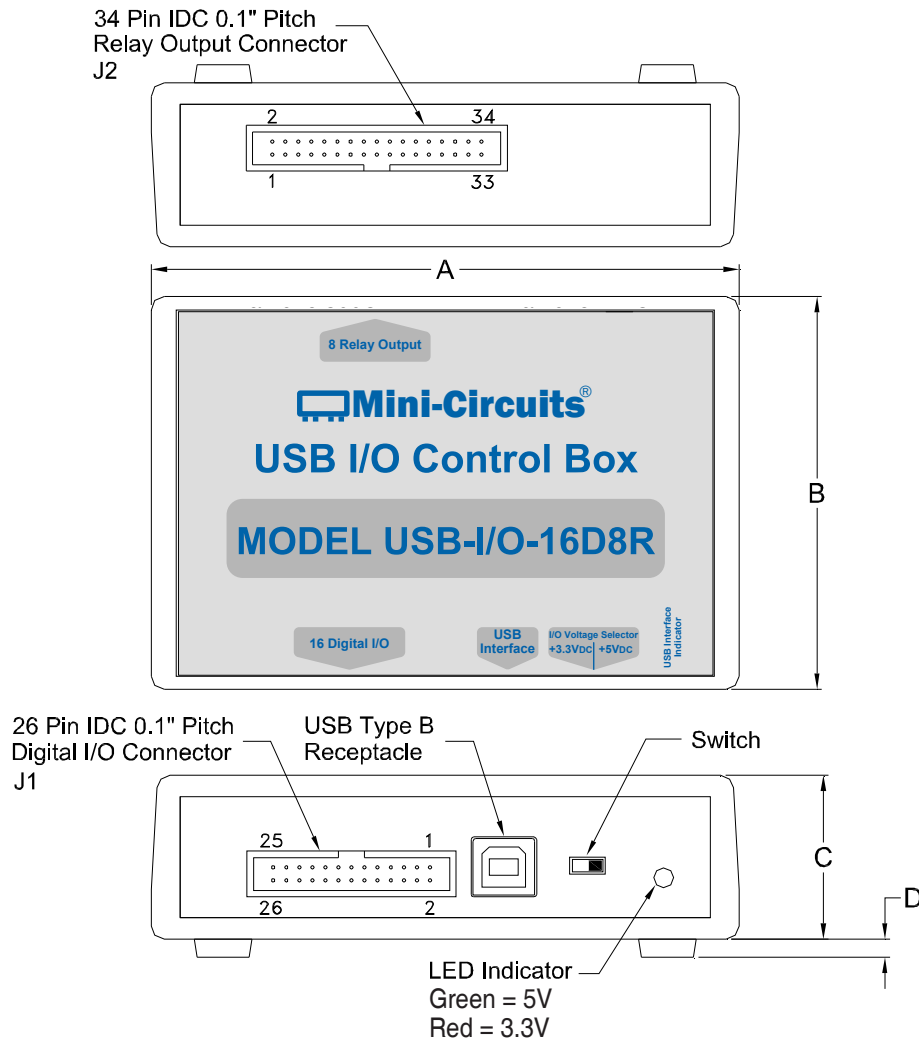
## Simplified diagram



## Application examples



## Outline Drawing: (LE1562)



### Outline Dimensions (inch / mm)

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

## 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](mailto: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-16D8R	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-26-1+	1 ft (0.3 m) 26 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-26-1+ (Spare)	1 ft (0.3 m) 26 pin cable assembly with IDC conn.
FCBL-26-2+	2 ft (0.6 m) 26 pin cable assembly with IDC conn.
FCBL-26-3+	3 ft (0.9 m) 26 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

- A. 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.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. 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](http://www.minicircuits.com/MCLStore/terms.jsp)

