

USB I/O CONTROL BOX

USB-I/O-16D8R

8 form C relays and 16 digital I/O channels

The Big Deal

- USB HID device compatible with 32/64 Bit operating systems
- 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
- Includes installation software with a friendly GUI and an API DLL com object on CD



Case Style: LE1562

Installation CD



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. Other protocols can be programed by the user using the supplied API DLL com object. 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_{AC} at 0.5A or DC load of 24V_{DC} at 1A and use approximately 25mA each when in operation.

The control box draws all required power from the USB bus (500mA max at 5V) , no external power adaptor is 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. The model is supplied with a CD containing installation software featuring a friendly GUI and an API-DLL Com object. Also supplied are a 2.7 ft USB cable and 1 ft IDC cable assemblies for the Relays and Digital I/O connectors. Longer USB and IDC cables are available as additional accessories.

Key Features

Feature	Advantages
USB HID (Human Interface Device)	Plug-and-Play (no need to install a driver for the device).
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 _{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.
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).
32/64 Bit operating systems	Compatible with Windows and Linux operating systems using 32 and 64 bit architecture.
Software CD, USB cable and IDC cable assemblies included	A CD containing a programing instructions for Linux and windows operating systems (32 and 64 bit systems) and a Windows GUI program containing an API DLL com object is included with the USB-I/O-16D8R as is a 2.7 ft USB cable and 1 ft 26 and 34 wire IDC cable assemblies.



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IF/RF MICROWAVE COMPONENTS

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USB I/O CONTROL BOX

USB-I/O-16D8R

8 form C relays and 16 digital I/O channels

Features

- Low cost solution for automatic relay control
- Easy installation and operation
- 8 buffered relays (1A DC) with N_C and N_O outputs available for use
- 16 digital outputs (2 Bytes X 8 channels each) selectable as TTL or LVTTTL
- All required operating power drawn from USB
- Compatible with 32/64-bit Windows® or Linux® operating systems
- ActiveX com object and .Net class library for use with other software: C++, C#, CVI®, Delphi®, LabVIEW® 8 or newer, MATLAB® 7 or newer, Python, Agilent VEE®, Visual Basic®, Visual Studio® 6 or newer, and more¹
- Friendly Windows® Graphical User Interface



Case Style: LE1562

Installation CD

Model No.	Description	Price	Qty.
USB-I/O-16D8R	USB I/O CONTROL BOX	\$169.95 ea.	(1-4)
Included Accessories			
USB-CBL-AB-3+	2.7 ft USB cable		1
FCBL-26-1+	1 ft 26 wire flat cable assy.		1
FCBL-34-1+	1 ft 34 wire flat cable assy.		1
I/O-CD	Installation CD		1

Applications

- Lab
- Test equipment
- Control systems

RoHS Compliant

See our web site for RoHS Compliance methodologies and qualifications

Mini-Circuits Software GUI for USB I/O Control Box



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Rev. A
M138140
EDR-10266
USB-I/O-16D8R
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Page 2 of 8

Electrical Specifications

Parameter	Connectors	Conditions	Min.	Typ.	Max.	Units
DIGITAL I/O	26 pin horizontal IDC header. See table on page 5 for details.	16 I/O logic ‘1’ levels (selectable) ²	3.3	–	5	V
Digital Input (2 Bytes x 8 channels each, TTL/LVTTL selectable ‘1’=5V when indicator Red or ‘1’=3.3V when indicator Green) ²						
Logic high	26 pin horizontal IDC header. See table on page 5 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 ³	–	–	32	mA
		LVTTL, Current through a single line ³	–	–	24	
Digital Output (2 Bytes x 8 channels each, TTL/LVTTL selectable ‘1’=5V when indicator Red or ‘1’=3.3V when indicator Green) ²						
Logic high	26 pin horizontal IDC header. See table on page 5 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 ³	–	–	32	mA
		LVTTL, Current through a single line ³	–	–	24	
Relay Outputs (Contact arrangement: SPDT, form C)						
DC load	34 pin horizontal IDC header. See table on page 5 for details.	@24V	–	–	1	A
AC Load		@125V	–	–	0.5	
Relay On (each relay)		@5V	–	25	–	mA
Contact resistance		Relays closed	–	–	0.1	Ω
Life		Mechanical.	5 Million	–	–	operations
Operate time			–	7	10	msec
Release time			–	4	8	msec
Operating frequency	Electrical (under load)	–	–	1,800	Operations / hour	
	Mechanical	–	–	36,000		
BUS Type	USB 2.0, USB 1.1 compatible					
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	–	

² Switching between TTL and LVTTL modes is preformed by means of an external switch. Switching between input and output modes is a software function.

³ 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 _{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

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 _O)	Normally Closed (N _C)
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

Minimum System Requirements

Interface	USB HID
Host operating system	32 Bit operating system: Windows 98®, Windows XP®, Windows Vista®, Windows 7® 64 Bit operating system: Windows Vista®, Windows 7® Linux® support: 32/64 Bit operating system
Hardware	Pentium® II or better

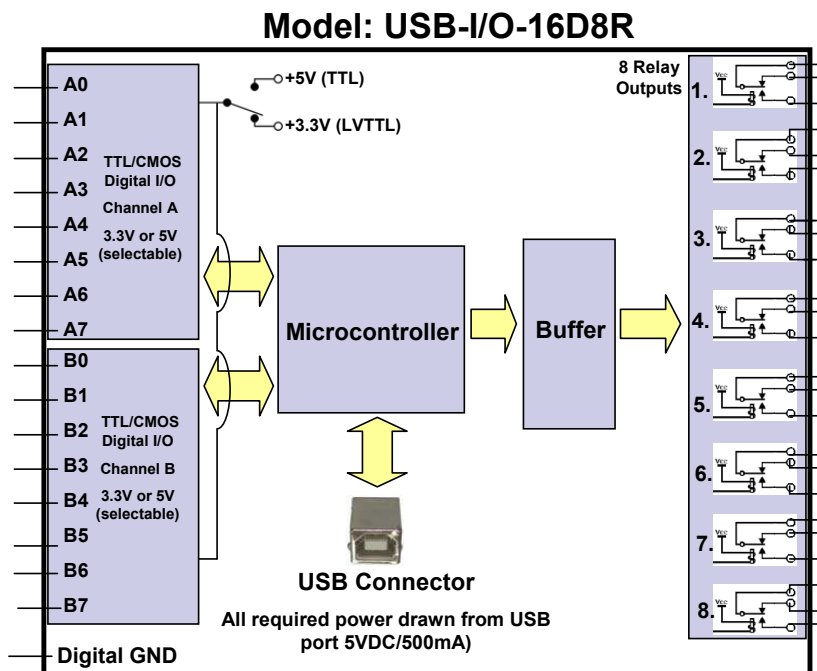


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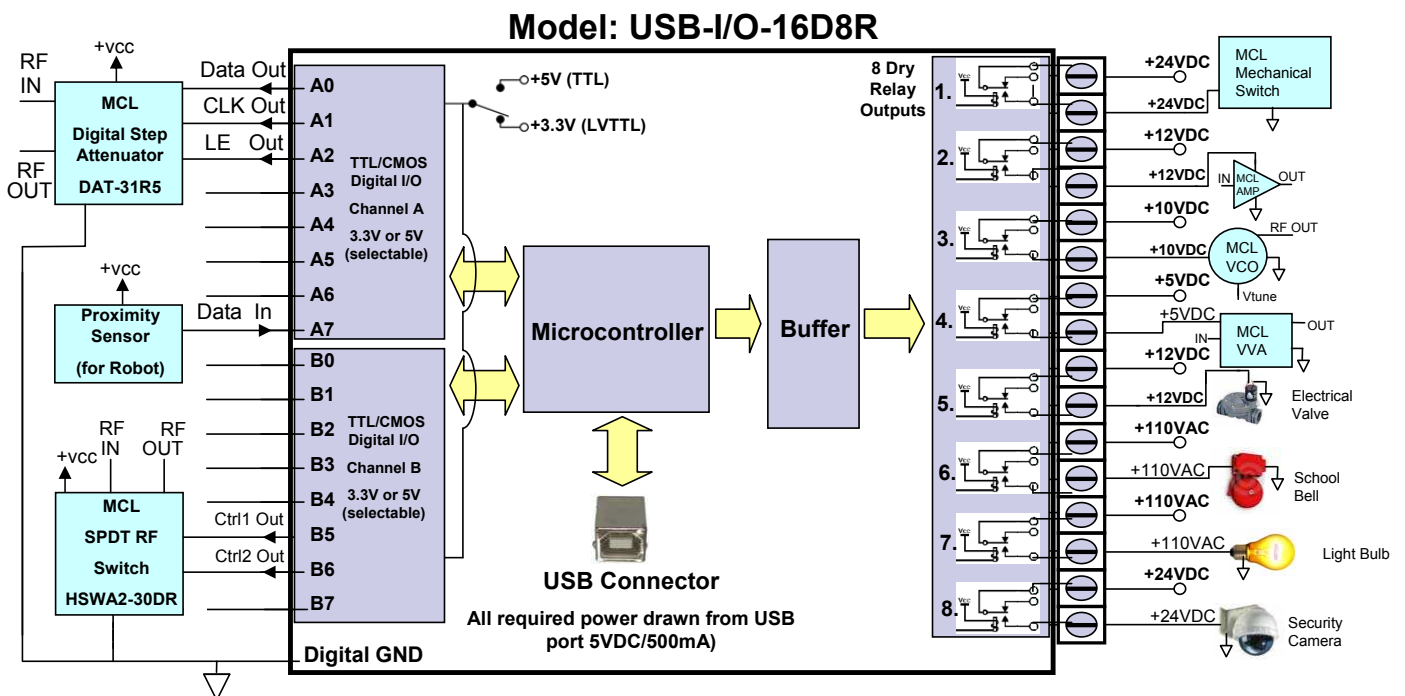
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Simplified diagram



Application examples



Complementary Products



USB Power Sensors

(8 Models):

- 1) PWR-8GHS ; 1 to 8000 MHz
- 2) PWR-8FS ; 1 to 8000 MHz
- 3) PWR-6G ; 1 to 6000 MHz
- 4) PWR-6GHS ; 1 to 6000 MHz
- 5) PWR-4GHS ; 9kHz to 4000 MHz
- 6) PWR-4RMS ; 50 to 4000 MHz
- 7) PWR-2.5GHS-75 ; 100kHz to 2500 MHz
- 8) PWR-2GHS-75 ; 100kHz to 2000 MHz



USB controlled Synthesized Signal Generators

(2 Models):

- 1) SSG-4000LH ; 250 to 4000 MHz
- 2) SSG-4000HP ; 250 to 4000 MHz



Narrow band USB controlled

Synthesized Signal Generators (Various models):

frequency coverage

400 MHz to 4000 MHz.



USB controlled Frequency Counter:

- UFC-6000 ; 1 to 6000 MHz



USB controlled RF switches

(5 Models, DC to 18GHz range):

- 1) USB-1SPDT-A18 ; Single SPDT switch
- 2) USB-2SPDT-A18 ; Two SPDT switches
- 3) USB-3SPDT-A18 ; Three SPDT switches
- 4) USB-4SPDT-A18 ; Four SPDT switches
- 5) USB-8SPDT-A18 ; Eight SPDT switches



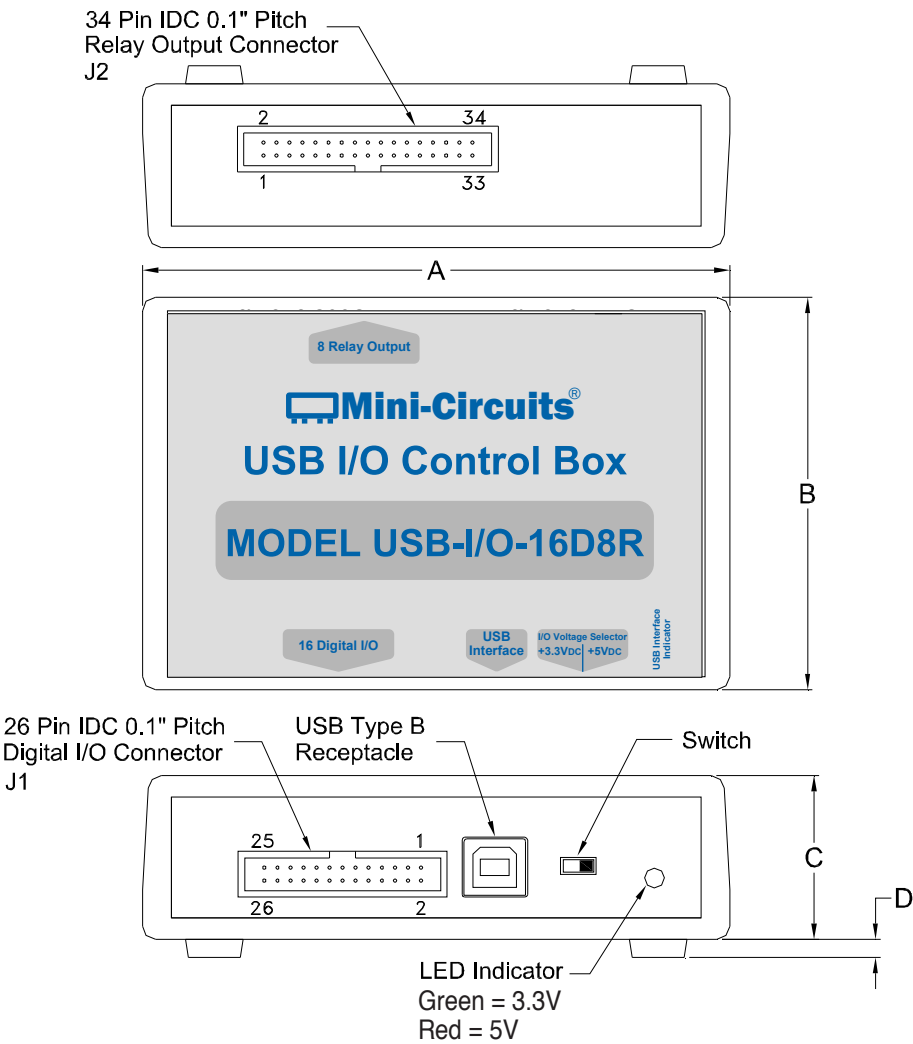
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Outline Drawing: (LE1562)



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



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Model	Description
USB-I/O-16D8R	USB I/O Control Box

Included Accessories	Description
I/O-CD	Installation CD
USB-CBL-AB-3+	2.7ft USB cable
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.



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