

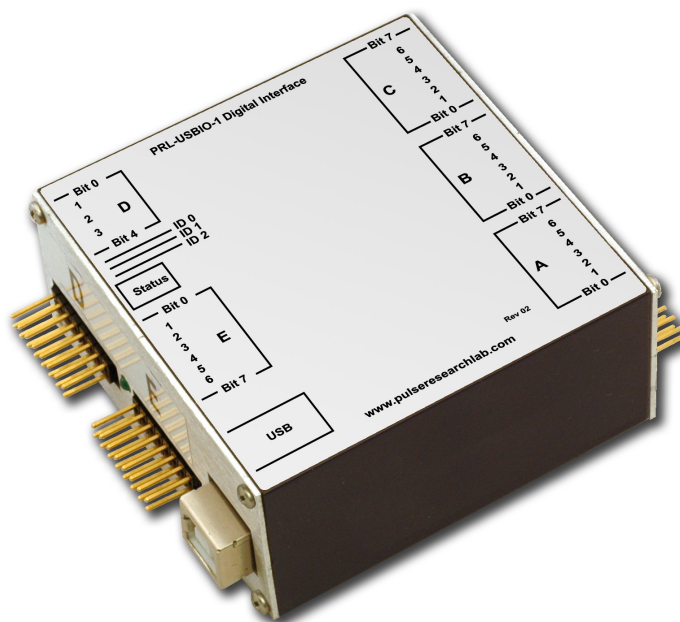
PRL-USBIO-1, USB Digital Interface Module

FEATURES

- USB connectivity
- 37 I/O pins, individually configurable
- 3 ID pins
- C++ and LabVIEW support for Win32 and Win64

APPLICATIONS

- Control of switches, scanners, and logic gates from Pulse Research Lab or other manufacturers
- Trigger generation/detection
- Generic low-speed digital I/O
- System integration



PRL-USBIO-1

DESCRIPTION:

The PRL-USBIO-1 module provides Windows-based USB control of PRL switches, scanners, and logic gates via USB. The module can also be used to control 3rd-party equipment and/or to provide or detect external triggers.

Each of 4 ports A, B, C, and E contains 8 pairs of signal/ground pins, Bits 0-7. Each port may be configured for input or output.

For Port D only, the 3 uppermost bits are reserved for the module ID (000 - 111 binary, corresponding to 0 - 7 decimal). The ID pins are pulled up internally, for a default ID of 111 = 7, and can be pulled down by grounding one or more pins with standard jumpers. A TTL-compatible High input (>2.0 V) will result in a value of 1.

The remaining 5 bits for Port D, D0 - D4, are available for I/O.

When configured as outputs, each signal pin will be shorted to GND or will output a nominal 5 V signal, depending on the 5-bit or 8-bit value written to the corresponding port.

When configured as inputs, each port will read a 5-bit or 8-bit value, depending on whether the signal pins read a TTL 0 (<0.8 V, nominal) or a TTL 1 (>2.0 V, nominal) at their inputs.

Ports A - D are connected to a pair of MCP23S17 serial port expanders which can source or sink 25 mA per pin, with the absolute maximum on V_{DD} not exceed 125 mA and on V_{SS} not to exceed 150 mA per expander device. Ports A and B share one MCP23S17 device, and Ports C and D share another MCP23S17 device, so each device can handle the rated current on V_{DD} and V_{SS} .

For example, 3 pins on each device can source a full 25 ma each and 4 pins on each device could sink 25 ma each and stay within absolute maximums.

Port E is driven directly off the Microchip PIC18F2550 CPU, and current on those pins varies by pin, but typically 8 - 10 mA. All of the port pins have a $5.1\ \Omega$ series resistor.

Power is supplied via USB.



PRL-USBIO-1.pdf
PRL-USBIO-1 Datasheet
Revised: 06/10/22

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*SPECIFICATIONS (0° C ≤ T_A ≤ 35° C)

SYMBOL	PARAMETER	Min	Typ	Max	UNIT	Comments
	I/O Pin Spacing		0.10		in.	0.025" square post header pins
	USB Receptacle		Type-B plug			
	USB Standard		USB 1.1			
V _{IH}	Voltage Input Threshold, High	2.0			V	Configured for input
V _{IL}	Voltage Input Threshold, Low			0.8	V	Configured for input
V _{OH}	Voltage Output, High		5		V	Into 1 MΩ
V _{OL}	Voltage Output, Low		0		V	Into 1 MΩ
I _{MAX1}	Max current/pin, ports A-D		25		mA	Limited to +125/-150 mA per expander
I _{MAX2}	Max current/pin, port E		8		mA	
L	Length		3.60		in.	Including connectors
W	Width		2.90		in.	
H	Height		1.31		in.	
	Weight		4.3		Oz.	

PRL-USBIO-1 Digital Interface Bit 0 1 2 3 4 5 6 7 Bit 4 ID 0 ID 1 ID 2 Status Bit 0 1 2 3 4 5 6 7 Bit 7 6 5 4 3 2 1 0 Bit 7 6 5 4 3 2 1 0 Bit 7 6 5 4 3 2 1 0 USB Rev 02 www.pulseresearchlab.com	Universal IO Device Port Bits Port Direction Input Polarity Analog Inputs Set Clear buttons for A0-A7, B0-B7, C0-C7, D0-D7, E0-E7 When checked I/O pins are high - Inverted inputs are low	PRL-USBIO-1 Demo App Discover Configure Write/Read Stop Num Devices Found: 0 Device IDs Found: 0-7 Port A Config: 1 Port B Config: 1 Port C Config: 1 Port D Config: 1 Port E Config: 1 Port A Write: 0 Port B Write: 0 Port C Write: 0 Port D Write: 0 Port E Write: 0 Port A Read: 0 Port B Read: 0 Port C Read: 0 Port D Read: 0 Port E Read: 0 Discover Success Config Success Write Success Read Success Device IDs: 0-7 0 = Output 1 = Input Ports A, B, C, D: 0-255 Port E: 0-31
PRL-USBIO-1 Decal	PRLIO.exe Windows Application with Visual Studio C++ Source Code Project	PRL-USBIO LabVIEW Demo Application and VIs

Software Support (download from www.pulseresearchlab.com/products/prl-usbio-1):

- C++ driver and sample application (.exe and source) for Win32 and Win64.
- LabVIEW 2017 VI primitives, sample application, and run-time executable.

Port E, Pins 0-3, also can be programmed for ADC input, outputting a 10-bit word corresponding to an analog input voltage of 0.0 – 5.0 V, nominal (e.g. approximately 5 mV per LSB), but this feature is not specified, guaranteed, or supported by PRL.



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PRL-USBIO-1.pdf, PRL-USBIO Datasheet REVISIONS

REV.	SECTION	Description	DATE	AUTHORIZED BY
06/10/22	All	Initial Release.	06/10/22	StK