

# USB-DIO96H

## Specifications



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# Specifications

**This specification applies to revision 2 hardware and later**

This specification covers revision 2 of the USB-DIO96H hardware, which uses a 5 V power supply. Revision 1 of the USB-DIO96H hardware was designed with a 9 V power supply and daisy chained hub. For revision 1 hardware specifications, refer to [www.mccdaq.com/PDFs/specs/USB-DIO96H\\_R1-spec.pdf](http://www.mccdaq.com/PDFs/specs/USB-DIO96H_R1-spec.pdf).

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

## Digital input/output

Table 1. Digital I/O specifications

Output	74ABT244A
Input	74ACT373
Configuration	Eight banks of 8, eight banks of 4, programmable by bank as input or output
Pull-up/pull-down	High-impedance pull-up/pull-down selectable via DIP switch for each digital input port.
Number of I/O	96
Output high	2.0 V min @ -24 mA
Output low	0.5 V max @ 64 mA
Input high	2.0 V min, 5.5 V max
Input low	0.8 V max, -0.5 V absolute min
Input impedance	47 kΩ (series resistance)
Source current	Maximum = 24 mA per output
Sink current	Maximum = 64 mA per output
Power up/reset state	Input mode
Debounce mode	Debouncing option available through firmware that samples all inputs eight times over a specified interval and latches out the input state only when eight consecutive samples are identical (all 0s or all 1s). Available debouncing intervals are 1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms, and 400 ms.
Debounce interval accuracy	+0% / -12.5%

## Power

Table 2. Power specifications

Parameter	Conditions	Specification
USB +5 V input voltage range		4.75 V min. to 5.25 V max.
USB +5 V supply current	All modes of operation	<100 mA
External power input (Note 1)		5 VDC ± 5% (5 VDC power supply provided)
External power supply (included)	MCC p/n PS-5V3AEPS	5 VDC, 15 W, 5% regulation
Alternate external power supply	From PC auxiliary power (cable not included)	Jumper-selectable Molex <sup>®</sup> connector internal to case
Voltage supervisor limits	4.13 V > V <sub>ext</sub> or V <sub>ext</sub> > 5.59 V	PWR LED = Off; (power fault)
	4.13 V < V <sub>ext</sub> < 5.59 V	PWR LED = On
Power supply current		2.7 A max
User 5 V output voltage range	Available at 5 V screw terminals	4.0 V min., 5.25 V max.
User 5 V output current available	Total from all 5 V screw terminals	50 mA max

**Note 1:** Voltage specification applies at barrel plug power input. The power supply provided with the board meets this specification at the rated total power supply current. If a different power supply is used, small line resistances could cause significant voltage drop between the power supply and the barrel plug input.

## Counter

Table 3. Counter specifications

Pin name (Note 2)	CTR
Counter type	Event counter
Number of channels	1
Input source	CTR screw terminal
Input type	TTL, rising edge triggered
Resolution	32 bits
Schmidt trigger hysteresis	20 mV to 100 mV
Input leakage current	$\pm 1 \mu\text{A}$
Maximum input frequency	1 MHz
High pulse width	500 ns min
Low pulse width	500 ns min
Input high voltage	4.0 V min, 5.5 V absolute max
Input low voltage	1.0 V max, -0.5 V absolute min

**Note 2:** CTR is a Schmitt trigger input protected with a 1.5 k $\Omega$  series resistor.

## Environmental

Table 4. Environmental specifications

Operating temperature range	0 to 60 °C
Storage temperature range	-40 to 85 °C
Humidity	0 to 90% non-condensing

## USB specifications

Table 5. USB specifications

USB "B" connector	Input
USB device type	USB 2.0 (full-speed)
Device compatibility	USB 1.1, USB 2.0
USB cable type	A-B cable, UL type AWM 2527 or equivalent. (min 24 AWG VBUS/GND, min 28 AWG D+/D-)
USB cable length	3 meters max.

## Data transfer rates

Table 6. Data transfer rate specifications

Digital I/O transfer rates (software paced)	System dependent, 33 to 250 port reads/writes or single bit reads/writes per second typ.
Counter/timer read/write rates (software paced)	Counter read – system-dependent, 33 to 250 reads per second.
	Counter clear – system-dependent, 33 to 250 writes per second.

## Mechanical

Table 7. Mechanical specifications

Card dimensions	304.8 mm (L) x 121.9 mm (W) x 20.0 mm (H)
	12.0" (L) x 4.8" (W) x 0.8" (H)
Enclosure dimensions	342.9 mm (L) x 125.7 mm (W) x 58.9 mm (H)
	13.50" (L) x 4.95" (W) x 2.32" (H)

## Main connector and pin out

Table 8. Connector specifications

Connector type	Screw terminal
Wire gauge range	14 AWG to 30 AWG

Table 9. Screw terminal pin out

Board label	Signal name	Board label	Signal name		
Port 1	A0	P1A0 (FIRSTPORTA Bit 0)	Port 3	A0	P3A0 (THIRDPORТА Bit 0)
	A1	P1A1 (FIRSTPORTA Bit 1)		A1	P3A1 (THIRDPORТА Bit 1)
	A2	P1A2 (FIRSTPORTA Bit 2)		A2	P3A2 (THIRDPORТА Bit 2)
	A3	P1A3 (FIRSTPORTA Bit 3)		A3	P3A3 (THIRDPORТА Bit 3)
	A4	P1A4 (FIRSTPORTA Bit 4)		A4	P3A4 (THIRDPORТА Bit 4)
	A5	P1A5 (FIRSTPORTA Bit 5)		A5	P3A5 (THIRDPORТА Bit 5)
	A6	P1A6 (FIRSTPORTA Bit 6)		A6	P3A6 (THIRDPORТА Bit 6)
	A7	P1A7 (FIRSTPORTA Bit 7)		A7	P3A7 (THIRDPORТА Bit 7)
	B0	P1B0 (FIRSTPORTB Bit 0)		B0	P3B0 (THIRDPORТB Bit 0)
	B1	P1B1 (FIRSTPORTB Bit 1)		B1	P3B1 (THIRDPORТB Bit 1)
	B2	P1B2 (FIRSTPORTB Bit 2)		B2	P3B2 (THIRDPORТB Bit 2)
	B3	P1B3 (FIRSTPORTB Bit 3)		B3	P3B3 (THIRDPORТB Bit 3)
	B4	P1B4 (FIRSTPORTB Bit 4)		B4	P3B4 (THIRDPORТB Bit 4)
	B5	P1B5 (FIRSTPORTB Bit 5)		B5	P3B5 (THIRDPORТB Bit 5)
	B6	P1B6 (FIRSTPORTB Bit 6)		B6	P3B6 (THIRDPORТB Bit 6)
	B7	P1B7 (FIRSTPORTB Bit 7)		B7	P3B7 (THIRDPORТB Bit 7)
	C0	P1C0 (FIRSTPORTC Bit 0)		C0	P3C0 (THIRDPORТC Bit 0)
C1	P1C1 (FIRSTPORTC Bit 1)	C1	P3C1 (THIRDPORТC Bit 1)		
C2	P1C2 (FIRSTPORTC Bit 2)	C2	P3C2 (THIRDPORТC Bit 2)		
C3	P1C3 (FIRSTPORTC Bit 3)	C3	P3C3 (THIRDPORТC Bit 3)		
C4	P1C4 (FIRSTPORTC Bit 4)	C4	P3C4 (THIRDPORТC Bit 4)		
C5	P1C5 (FIRSTPORTC Bit 5)	C5	P3C5 (THIRDPORТC Bit 5)		
C6	P1C6 (FIRSTPORTC Bit 6)	C6	P3C6 (THIRDPORТC Bit 6)		
C7	P1C7 (FIRSTPORTC Bit 7)	C7	P3C7 (THIRDPORТC Bit 7)		
5V	5V	5V	5V		
GND	GND	GND	GND		
Port 2	A0	P2A0 (SECONDPORТА Bit 0)	Port 4	A0	P4A0 (FOURTHPORТА Bit 0)
	A1	P2A1 (SECONDPORТА Bit 1)		A1	P4A1 (FOURTHPORТА Bit 1)
	A2	P2A2 (SECONDPORТА Bit 2)		A2	P4A2 (FOURTHPORТА Bit 2)
	A3	P2A3 (SECONDPORТА Bit 3)		A3	P4A3 (FOURTHPORТА Bit 3)
	A4	P2A4 (SECONDPORТА Bit 4)		A4	P4A4 (FOURTHPORТА Bit 4)
	A5	P2A5 (SECONDPORТА Bit 5)		A5	P4A5 (FOURTHPORТА Bit 5)
	A6	P2A6 (SECONDPORТА Bit 6)		A6	P4A6 (FOURTHPORТА Bit 6)
	A7	P2A7 (SECONDPORТА Bit 7)		A7	P4A7 (FOURTHPORТА Bit 7)
	B0	P2B0 (SECONDPORТB Bit 0)		B0	P4B0 (FOURTHPORТB Bit 0)
	B1	P2B1 (SECONDPORТB Bit 1)		B1	P4B1 (FOURTHPORТB Bit 1)
	B2	P2B2 (SECONDPORТB Bit 2)		B2	P4B2 (FOURTHPORТB Bit 2)
	B3	P2B3 (SECONDPORТB Bit 3)		B3	P4B3 (FOURTHPORТB Bit 3)
	B4	P2B4 (SECONDPORТB Bit 4)		B4	P4B4 (FOURTHPORТB Bit 4)
	B5	P2B5 (SECONDPORТB Bit 5)		B5	P4B5 (FOURTHPORТB Bit 5)
	B6	P2B6 (SECONDPORТB Bit 6)		B6	P4B6 (FOURTHPORТB Bit 6)
	B7	P2B7 (SECONDPORТB Bit 7)		B7	P4B7 (FOURTHPORТB Bit 7)
	C0	P2C0 (SECONDPORТC Bit 0)		C0	P4C0 (FOURTHPORТC Bit 0)
C1	P2C1 (SECONDPORТC Bit 1)	C1	P4C1 (FOURTHPORТC Bit 1)		
C2	P2C2 (SECONDPORТC Bit 2)	C2	P4C2 (FOURTHPORТC Bit 2)		
C3	P2C3 (SECONDPORТC Bit 3)	C3	P4C3 (FOURTHPORТC Bit 3)		
C4	P2C4 (SECONDPORТC Bit 4)	C4	P4C4 (FOURTHPORТC Bit 4)		
C5	P2C5 (SECONDPORТC Bit 5)	C5	P4C5 (FOURTHPORТC Bit 5)		
C6	P2C6 (SECONDPORТC Bit 6)	C6	P4C6 (FOURTHPORТC Bit 6)		
C7	P2C7 (SECONDPORТC Bit 7)	C7	P4C7 (FOURTHPORТC Bit 7)		
CTR	CTR	5V	5V		
GND	GND	GND	GND		

## Ribbon connectors and pin out

Table 10. Ribbon connector specifications

Connectors	P1-P4: 50-pin 0.1" IDC type box header
Compatible cables	C-50FF-x, 50-pin ribbon cable
Compatible accessory products (Note 3)	SSR-PB24

**Note 3:** P1-P4 connectors are located inside the enclosure. These connectors are available for applications where the enclosure is not required.

### P1

Table 11. P1 pin-out

Pin	Signal name	Pin	Signal name
1	FIRSTPORTC Bit 7	2	GND
3	FIRSTPORTC Bit 6	4	GND
5	FIRSTPORTC Bit 5	6	GND
7	FIRSTPORTC Bit 4	8	GND
9	FIRSTPORTC Bit 3	10	GND
11	FIRSTPORTC Bit 2	12	GND
13	FIRSTPORTC Bit 1	14	GND
15	FIRSTPORTC Bit 0	16	GND
17	FIRSTPORTB Bit 7	18	GND
19	FIRSTPORTB Bit 6	20	GND
21	FIRSTPORTB Bit 5	22	GND
23	FIRSTPORTB Bit 4	24	GND
25	FIRSTPORTB Bit 3	26	GND
27	FIRSTPORTB Bit 2	28	GND
29	FIRSTPORTB Bit 1	20	GND
31	FIRSTPORTB Bit 0	32	GND
33	FIRSTPORTA Bit 7	34	GND
35	FIRSTPORTA Bit 6	36	GND
37	FIRSTPORTA Bit 5	38	GND
39	FIRSTPORTA Bit 4	40	GND
41	FIRSTPORTA Bit 3	42	GND
43	FIRSTPORTA Bit 2	44	GND
45	FIRSTPORTA Bit 1	46	GND
47	FIRSTPORTA Bit 0	48	GND
49	VDD	50	GND

**P2**

Table 12. P2 pin-out

Pin	Signal name	Pin	Signal name
1	SECONDPORTC Bit 7	2	GND
3	SECONDPORTC Bit 6	4	GND
5	SECONDPORTC Bit 5	6	GND
7	SECONDPORTC Bit 4	8	GND
9	SECONDPORTC Bit 3	10	GND
11	SECONDPORTC Bit 2	12	GND
13	SECONDPORTC Bit 1	14	GND
15	SECONDPORTC Bit 0	16	GND
17	SECONDPORTB Bit 7	18	GND
19	SECONDPORTB Bit 6	20	GND
21	SECONDPORTB Bit 5	22	GND
23	SECONDPORTB Bit 4	24	GND
25	SECONDPORTB Bit 3	26	GND
27	SECONDPORTB Bit 2	28	GND
29	SECONDPORTB Bit 1	20	GND
31	SECONDPORTB Bit 0	32	GND
33	SECONDPORTA Bit 7	34	GND
35	SECONDPORTA Bit 6	36	GND
37	SECONDPORTA Bit 5	38	GND
39	SECONDPORTA Bit 4	40	GND
41	SECONDPORTA Bit 3	42	GND
43	SECONDPORTA Bit 2	44	GND
45	SECONDPORTA Bit 1	46	GND
47	SECONDPORTA Bit 0	48	GND
49	VDD	50	GND

**P3**

Table 13. P3 pin-out

Pin	Signal name	Pin	Signal name
1	THIRDPORTC Bit 7	2	GND
3	THIRDPORTC Bit 6	4	GND
5	THIRDPORTC Bit 5	6	GND
7	THIRDPORTC Bit 4	8	GND
9	THIRDPORTC Bit 3	10	GND
11	THIRDPORTC Bit 2	12	GND
13	THIRDPORTC Bit 1	14	GND
15	THIRDPORTC Bit 0	16	GND
17	THIRDPORTB Bit 7	18	GND
19	THIRDPORTB Bit 6	20	GND
21	THIRDPORTB Bit 5	22	GND
23	THIRDPORTB Bit 4	24	GND
25	THIRDPORTB Bit 3	26	GND
27	THIRDPORTB Bit 2	28	GND
29	THIRDPORTB Bit 1	20	GND
31	THIRDPORTB Bit 0	32	GND
33	THIRDPORTA Bit 7	34	GND
35	THIRDPORTA Bit 6	36	GND
37	THIRDPORTA Bit 5	38	GND
39	THIRDPORTA Bit 4	40	GND
41	THIRDPORTA Bit 3	42	GND
43	THIRDPORTA Bit 2	44	GND
45	THIRDPORTA Bit 1	46	GND
47	THIRDPORTA Bit 0	48	GND
49	VDD	50	GND

**P4**

Table 14. P4 pin-out

Pin	Signal name	Pin	Signal name
1	FOURTHPORTC Bit 7	2	GND
3	FOURTHPORTC Bit 6	4	GND
5	FOURTHPORTC Bit 5	6	GND
7	FOURTHPORTC Bit 4	8	GND
9	FOURTHPORTC Bit 3	10	GND
11	FOURTHPORTC Bit 2	12	GND
13	FOURTHPORTC Bit 1	14	GND
15	FOURTHPORTC Bit 0	16	GND
17	FOURTHPORTB Bit 7	18	GND
19	FOURTHPORTB Bit 6	20	GND
21	FOURTHPORTB Bit 5	22	GND
23	FOURTHPORTB Bit 4	24	GND
25	FOURTHPORTB Bit 3	26	GND
27	FOURTHPORTB Bit 2	28	GND
29	FOURTHPORTB Bit 1	20	GND
31	FOURTHPORTB Bit 0	32	GND
33	FOURTHPORTA Bit 7	34	GND
35	FOURTHPORTA Bit 6	36	GND
37	FOURTHPORTA Bit 5	38	GND
39	FOURTHPORTA Bit 4	40	GND
41	FOURTHPORTA Bit 3	42	GND
43	FOURTHPORTA Bit 2	44	GND
45	FOURTHPORTA Bit 1	46	GND
47	FOURTHPORTA Bit 0	48	GND
49	VDD	50	GND

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