

## Product Datasheet - Technical Specifications



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## Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

### Digital input/output

Table 1. Digital I/O specifications

Digital input type	74ACT373
Digital output type	74FCT244
Number of I/O	24 (port A0 through port C7)
Configuration	2 banks of 8 and 2 banks of 4 or 3 banks of 8
Pull up/pull-down configuration	Internal 47K resistors may be user configured for pull-up or pull-down via external connection of "Port x Pull-up / Pull-down" to "USB +5 V" or "GND". Ports A, B, and C are independently configurable.
Input high voltage	2.0 V min, 5.5 V absolute max
Input low voltage	0.8 V max, -0.5 V absolute min
Output high voltage (IOH = -15 mA)	2.4 V min
Output low voltage (IOL= 64 mA)	0.55 V max
Source current – (Note 1) ▪ Self -powered hub ▪ Externally-powered root port hub	Maximum = 15 mA per output
Source current – (Note 2) ▪ Bus-powered hub ▪ Battery-powered root port hub.	Not supported
Sink current - (Note 3)	Current sink max: 365 mA / [number of outputs]. 64 mA max sink current for any single output.
Power up/reset state	Input mode (high impedance)

**Note 1:** "Self-powered hub" refers to a USB hub with an external power supply. Self-powered hubs allow a connected USB device to draw up to 500 mA. "Root port hubs" reside in the PC's USB Host Controller. The USB port(s) on your PC are root port hubs. All externally powered root port hubs (i.e. desktop PC's) provide up to 500 mA of current for a USB device. In this configuration, all 24 digital outputs of the RedLab 1024HLS can source their per-pin maximum of 15 mA. This provides a total requirement of  $15 \text{ mA} \times 24 = 360 \text{ mA}$ . Combining this with the RedLab 1024HLS operating current of 135 mA a fully-loaded current draw of 495 mA is realized.

**Note 2:** "Bus-powered hub" refers to a USB hub that derives power directly from the USB +5 V and does not have its own power supply. These hubs allow a connected USB device to draw up to 100 mA. Battery-powered root port hubs provide 100 mA or 500 mA, depending upon the manufacturer. A laptop PC that is not connected to an external power adapter is an example of a battery-powered root port hub. If your laptop is constrained to the 100 mA maximum a RedLab 1024HLS is not guaranteed to work. In order to use the product you will need to purchase a self-powered hub.

**Note 3:** A low-side resettable fuse protects the RedLab 1024HLS. This is designed to protect the host PC or hub from an over current condition. Assuming all return currents in sinking applications return via the USB cable ground signal, the maximum allowable return current is 500 mA. Please include the RedLab 1024HLS unloaded operating current (135 mA) in your power budget.

## Counter section

Table 2. Counter specifications

Pin name (Note 4)	CTR
Counter type	Event counter
Number of channels	1
<i>Input source</i>	<i>CTR screw terminal</i>
Input type	TTL, rising edge triggered
Resolution	32 bits
<i>Schmitt trigger hysteresis</i>	<i>20 mV to 100 mV</i>
<i>Input leakage current</i>	$\pm 1 \mu A$
Maximum input frequency	1 MHz
<i>High pulse width</i>	<i>500 ns min</i>
<i>Low pulse width</i>	<i>500 ns min</i>
Input low voltage	0 V min, 1.0 V max
Input high voltage	4.0 V min, 15.0 V max

**Note 4:** CTR is a Schmitt trigger input

## Power

Table 3. Power specifications

Parameter	Conditions	Specification
Supply current (Note 5)	No load	80mA typ, 135 mA max
Input power requirements (Note 6)		4.75 V min, 5.25 V max
USB +5 V power available	Measured at "USB +5 V" screw terminals (pins 10, 14, and 30)	4.4 V min, 5.25 V max
USB +5 V power output current (Note 7)	Connected to: <ul style="list-style-type: none"> <li>▪ Self-powered hub</li> <li>▪ Externally-powered root port hub</li> </ul>	[350 mA] – [total output source current]
USB +5 V over-current protection	Resettable fuse	Hold current: 350 mA, typical
		Trip current: 700 mA typical
		<i>Trip/recovery time: 100 mS, max</i>
		<i>On resistance: 1.3 Ohms max</i>

**Note 5:** This is the total (no load) current requirement for the RedLab 1024HLS.

**Note 6:** Bus-powered hubs are allowed to provide downstream USB power as low as 4.4 V. Although your RedLab 1024HLS will typically function at this 4.4 V minimum, guaranteed performance requires a minimum power supply voltage of 4.75 V. All self-powered and root port hubs will meet this 4.75 V minimum.

**Note 7:** See available source/sink current level in the "Digital input/output" section.

## General

Table 4. General specifications

Parameter	Conditions	Specification
USB controller clock Error	25 °C	±30 ppm max
	0 to 70 °C	±50 ppm max
Device type		USB 1.1 low-speed
Device compatibility		USB 1.1, USB 2.0

## Environmental

Table 5. Environmental specifications

Operating temperature range	0 to 70 °C
Storage temperature range	-40 to 70 °C
Humidity	0 to 90% non-condensing

## Mechanical

Table 6. Mechanical specifications

Dimensions	79 mm (L) x 82 mm (W) x 25 mm (H)
USB cable length	3 meters max
USB cable type	A-B cable, UL type AWM 2527 or equivalent. (min 24 AWG VBUS/GND, min 28 AWG D+/D-)
User connection length	3 meters max

## Main connector and pin out

Table 7. Connector specifications

Connector type	Screw terminal
Wire gauge range	30-16 AWG

Table 8. Connector pin out

Pin	Signal Name	Pin	Signal Name
1	Port C0	21	Port A0
2	Port C1	22	Port A1
3	Port C2	23	Port A2
4	Port C3	24	Port A3
5	Port C4	25	Port A4
6	Port C5	26	Port A5
7	Port C6	27	Port A6
8	Port C7	28	Port A7
9	GND	29	GND
10	USB +5 V	30	USB +5 V
11	Port C Pull-up / Pull-down	31	GND
12	GND	32	Port B0
13	Port B Pull-up / Pull-down	33	Port B1
14	USB +5 V	34	Port B2
15	Port A Pull-up / Pull-down	35	Port B3
16	GND	36	Port B4
17	GND	37	Port B5

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<b>Pin</b>	<b>Signal Name</b>	<b>Pin</b>	<b>Signal Name</b>
18	GND	38	Port B6
19	GND	39	Port B7
20	CTR	40	GND