USB-4302

Specifications

Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic* text are guaranteed by design.

Counter

Refer to the CTS9513-2 data sheet for complete 9513 specifications and operating modes. The CTS9513-2 data sheet is available on our web site at www.mccdaq.com/PDFmanuals/9513A.pdf.

Table 1. Counter specifications

Parameter	Conditions
Counter type	9513
Configuration	One 9513 device. Five up/down counters, 16-bits each.
Compatibility	5V/TTL
The 9513 device is programmable for:	
Clock source	Software selectable: External: ▪ Counter 1-5 clock inputs ▪ Counter 1-5 gate inputs Internal: ▪ Terminal count of previous counter ▪ Internal clock frequency scaler (default; divided by 1)
Gate	Software selectable source: External: ▪ Active high or low level or edge, counter $1-5$ gate input ▪ Active high level previous gate or next gate ▪ All external gate signals (CTRxGATE) individually pulled up through 47 K resistors to +5 V. Internal: ▪ Active high previous counter terminal count ▪ No gating (default)
Output	Software selectable: ▪ Always low (default) ▪ High pulse on terminal count ▪ Low pulse on terminal count ▪ Toggle on terminal count ▪ Inactive, high impedance at user connector counter # output.
Osc Out	Software selectable source: ▪ Counter # input ▪ Gate # input ▪ Prescaled internal clock (default) Software selectable divider: ▪ Division by 1-16 (default = 16)
Clock input frequency	20 MHz max (50 nS min period)
Internal clock frequencies (Generated from 12 MHz crystal oscillator.)	Software selectable: ▪ 5.0000 MHz (default) ▪ 3.3333 MHz ▪ 1.6667 MHz ▪ 1.0000 MHz
Internal clock frequency prescaler	BCD scaling (Internal clock divided by 1, 10, 100, 1000 or 10000) or Binary scaling (Internal clock divided by 1, 16, 256, 4096 or 65536)
Internal clock generator accuracy	*±2 ppm*
12 MHz crystal oscillator accuracy	±50 ppm
High pulse width (clock input)	*25 ns min*

Parameter	Conditions
Low pulse width (clock input)	*25 ns min*
Gate width	*70 ns min*
Input low voltage	*-0.5 V min, 0.8V max*
Input high voltage	*2.0 V min, USB +5V power max*
Output low voltage @ IIl = 4 mA	*0.4 V max*
Output high voltage @ IIH = 4 mA	*2.4 V min*

Digital input / output

Table 2. Digital I/O specifications

Digital type	Discrete, 5V/TTL compatible
	Output: 74ACT373
	Input: 74ACT373
Number of I/O	8 input, 8 output
Configuration	1 bank of 8 as output, 1 bank of 8 as input
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	*3.3 volts min @ -24 mA (Vcc = 4.5 V)*
Output low voltage	*0.8 volts max @ 10 mA*
Data transfer	Programmed I/O
Power-up / reset state	Digital outputs reset to TTL low
Digital I/O transfer rate (system paced)	System dependent, 33 to 1000 port reads/writes or single bit reads/writes per second.
Pull-up/pull-down configuration	User configurable for pull-up/-down through 47 kΩ resistor (Note 1).
	All pins floating (default)

Note 1: Pull-up and pull-down configurations are available using the DI CTL connector pin 21. The pull-down configuration requires the DI CTL pin (pin 21) to be connected to a GND pin (pin 11). For a pull-up configuration, the DI CTL pin should be connected to the +5V pin (pin 20).

Interrupt Input

Table 3. Interrupt specifications

Implementation	Interrupts the microcontroller operation on the device to execute one or more of several firmware routines.
Interrupt characteristics	Rising edge (default) or falling edge triggered, user selectable
Firmware routines	Any or all of the following can be activated by the user: ▪ Generate USB event notification ▪ Latch digital inputs (Reading digital inputs returns most recently latched value.) ▪ Latch digital outputs (Most recently written digital output value is latched.) ▪ Save counts on any/all of counters 1-5.
Event latency to PC	1-33 ms (4 ms typical)
Maximum event notification rate	33-1000 Hz (system dependent) (Note 2)
Interrupt latency for latch operations	100 μs maximum (80 μs typical)

Note 2: The interrupt rate, when transferring information to the PC (event notification), is limited by the USB to a theoretical limit of 1 kHz. Some systems may not be able to achieve this maximum rate due to differences in USB controller implementation, traffic on the USB, or operating system activity.

Memory

Table 4. Memory specifications

EEPROM	256 bytes EEPROM memory available for external use.

Microcontroller

Table 5. Microcontroller specifications

Type	High performance 8-bit RISC microcontroller

USB +5V voltage

Table 6. USB +5V voltage specifications

Parameter	Conditions	Specification
USB +5V (VBUS) input voltage range		4.75 V min. to 5.25 V max.

LEDs

Table 7. USB +5V voltage specifications

Power LED	Indicates that the device's microcontroller has power and is running
Status LED	Indicates that the USB is configured; blinks to indicate USB traffic.

Power

Table 8. Power specifications

Parameter	Conditions	Specification
Supply current (Note 3)	USB enumeration	100 mA max
Supply current	Maximum load	302 mA max.
User +5V output voltage range (pin 20)	Connected to self-powered hub. (Note 4)	4.75 V min. to 5.25 V max.
User +5V output current (pin 20)	Bus-powered and connected to a self-powered hub. (Note 4)	10 mA max.

Note 3: This is the total current requirement for the USB-4302 which includes up to 14 mA for the Power and Status LEDs, but does not include current sourced from the User +5V output or from the digital output pins.

Note 4: 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 (desktop PC's) provide up to 500 mA of current for a USB device. 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.

USB specifications

Table 9. USB specifications

USB device type	USB 2.0 (full-speed)
Device compatibility	USB 1.1, USB 2.0
Power requirements	Self-powered, 500 mA consumption max
USB cable type	*A-B cable, UL type AWM 2725 or equivalent. (min 24 AWG VBUS/GND, min 28 AWG D+/D-)*
USB cable length	3 meters max.

Environmental

Table 10. Environmental specifications

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

Mechanical

Table 11. Mechanical specifications

Dimensions	157.6 mm (L) x 92.7 mm (W) x 15.2 mm (H)
User connection length	3 meters max.

Main connector and pin out

Main connector P1 is compatible with the PCI-CTR05 and the CIO-CTR05.

Table 12. Main connector specifications

Connector type	37 pin shielded D-type, right angle
Compatible cables	▪ C37FF-x, unshielded ribbon cable ▪ C37FFS-x, shielded round cable
Compatible accessory products	CIO-MINI37 CIO-MINI37-VERT CIO-TERMINAL SCB-37

P1 pin out

Table 13. Main connector P1 pin out

Pin	Signal Name	Pin Description
1	INT	Interrupt Input
2	NC	Not Connected
3	DO7	Digital Output
4	DO6	Digital Output
5	DO5	Digital Output
6	DO4	Digital Output
7	DO3	Digital Output
8	DO2	Digital Output
9	DO1	Digital Output
10	DO0	Digital Output
11	GND	Ground
12	CTR5GATE	Counter 5 Gate
13	CTR5IN	Counter 5 input
14	CTR4GATE	Counter 4 Gate
15	CTR4IN	Counter 4 input
16	CTR3GATE	Counter 3 Gate
17	CTR3IN	Counter 3 input
18	CTR2GATE	Counter 2 Gate
19	CTR2IN	Counter 2 input
20	+5V	+5V Output
21	DI CTL	Pull-up/down connection
22	DI7	Digital Input
23	DI6	Digital Input
24	DI5	Digital Input
25	DI4	Digital Input
26	DI3	Digital Input
27	DI2	Digital Input
28	DI1	Digital Input
29	DI0	Digital Input
30	OSC OUT	Oscillator Output
31	CTR5OUT	Counter 5 output
32	CTR4OUT	Counter 4 output
33	CTR3OUT	Counter 3 output
34	CTR2OUT	Counter 2 output
35	CTR1OUT	Counter 1 output
36	CTR1IN	Counter 1 input
37	CTR1GATE	Counter 1 Gate

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