

USB-7202

Specifications



**MEASUREMENT
COMPUTING™**

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Specifications

All specifications are subject to change without notice.

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Analog input section

Table 1. Analog input specifications

Parameter	Conditions	Specification
A/D converter type		16-bit successive approximation type
Number of channels		8 single-ended
Input configuration		Individual A/D per channel
Sampling method		Simultaneous
<i>Absolute maximum input voltage</i>	<i>CHx IN to GND</i>	<i>±15 V maximum</i>
Input impedance		100 MOhm minimum
Input ranges	Software selectable	±10 V, ±5 V, ±2 V, ±1 V
Sampling rate	Scan to PC memory	0.6 S/s to 50 kS/s, software programmable
	Burst scan to 32 k sample FIFO	20 S/s to 50 kS/s, software programmable
Throughput	Software paced	500 S/s all channels, system-dependent
	Scan to PC memory (Note 1)	(100 kS/s) / (# of channels); maximum of 50 kS/s for any channel
	BURSTIO scan to 32 k Sample FIFO	= (200 kS/s) / (# of channels), maximum of 50 kS/s for any channel
Resolution		16 bits
<i>No missing codes</i>		<i>15 bits</i>
Crosstalk	Signal DC-25 KHz	-80 dB
Trigger source	Software selectable	External digital: TRIG_IN
Calibration		Cal factors stored in firmware. Cal factors must be applied to data via application software.

Note 1: Maximum throughput scanning to PC memory is machine dependent.

Table 2. Calibrated absolute accuracy

Range	Accuracy (mV)
±10 V	5.66
±5 V	2.98
±2 V	1.31
±1 V	0.68

Table 3. Accuracy components - All values are (±)

Range	% of Reading	Gain error at FS (mV)	Offset (mV)
±10 V	0.04	4.00	1.66
±5 V	0.04	2.00	0.98
±2 V	0.04	0.80	0.51
±1 V	0.04	0.40	0.28

Table 4 summarizes the noise performance for the USB-7202. Noise distribution is determined by gathering 50 K samples with inputs tied to ground at the user connector. Samples are gathered at the maximum specified sampling rate of 50 kS/s.

Table 4. Noise performance

Range	Typical counts	LSBrms
±10 V	10	1.52
±5 V	10	1.52
±2 V	11	1.67
±1 V	14	2.12

Digital input/output

Table 5. Digital I/O specifications

Parameter	Specification
Digital type	CMOS
Number of I/O	8 (DIO0 through DIO7)
Configuration	Independently configured for input or output
Pull-up/pull-down configuration	All pins configurable via jumper (JP1) to Vs or Ground via 47 K resistors.
Input high voltage	2.0 V minimum, 5.5 V absolute maximum
Input low voltage	0.8 V maximum, -0.5 V absolute minimum
Output high voltage (IOH = -2.5 mA)	3.8 V minimum
Output low voltage (IOL = 2.5 mA)	0.7 V maximum
Power on and reset state	Input

External trigger

Table 6. External trigger specifications

Parameter	Conditions	Specification
Trigger source (Note 2)	External digital	TRIG_IN
Trigger mode	Software selectable	Edge sensitive; user configurable for CMOS compatible rising or falling edge.
Trigger latency		10 μ s maximum
Trigger pulse width		1 μ s minimum
Input high voltage		4.0 V minimum, 5.5 V absolute maximum
Input low voltage		1.0 V maximum, -0.5 V absolute minimum
Input leakage current		$\pm 1.0 \mu$ A

Note 2: TRIG_IN is a Schmitt trigger input protected with a 1.5K Ohm series resistor.

External clock input/output

Table 7. External clock I/O specifications

Parameter	Conditions	Specification
Pin name		SYNC
Pin type		Bidirectional
Software selectable direction	Output	Outputs internal A/D pacer clock.
	Input	Receives A/D pacer clock from external source.
Input clock rate		50 kHz, maximum
Clock pulse width	Input	1 μ s minimum
	Output	5 μ s minimum
<i>Input leakage current</i>		$\pm 1.0\mu A$
Input high voltage		4.0 V minimum, 5.5 V absolute maximum
Input low voltage		1.0 V maximum, -0.5 V absolute minimum
Output high voltage (Note 3)	IOH = -2.5 mA	3.3 V minimum
	No load	3.8 V minimum
Output low voltage (Note 3)	IOL = 2.5 mA	1.1 V maximum
	No Load	0.6 V maximum

Note 3: SYNC is a Schmitt trigger input and is over-current protected with a 1.5 kOhm series resistor.

Counter section

Table 8. Counter specifications

Parameter	Specification
Pin name (Note 4)	CTR
Counter type	Event counter
Number of channels	1
Input type	TTL, rising edge triggered
Input source	CTR screw terminal
Resolution	32 bits
<i>Schmidt trigger hysteresis</i>	20 mV to 100 mV
<i>Input leakage current</i>	$\pm 1\mu A$
Maximum input frequency	1 MHz
<i>High pulse width</i>	500 ns minimum
<i>Low pulse width</i>	500 ns minimum
Input high voltage	4.0 V minimum, 5.5 V absolute maximum
Input low voltage	1.0 V maximum, -0.5 V absolute minimum

Note 4: CTR is a Schmitt trigger input protected with a 1.5K Ohm series resistor.

Memory

Table 9. Memory specifications

Parameter	Specification		
Data FIFO	32,768 samples, 65,536 bytes		
EEPROM	1,024 bytes		
EEPROM configuration	Address range	Access	Description
	0x000-0x1FF	Reserved	512 bytes system and Cal data
	0x200-0x3FF	Read/write	512 bytes user area

Microcontroller

Table 10. Microcontroller specifications

Parameter	Specification
Type	High performance 8-bit RISC microcontroller
Program memory	32,768 words
Data memory	3,936 bytes

Indicator LEDs

Table 11. Indicator LED specifications

Parameter	Specification
Power LED (top)	Indicates that the device's microcontroller has power and is configured.
Status LED	Blinks to indicate USB communications.
OEM power	OEM Connector; LED sink current up to 5 mA per LED @ 5 V _{max}

Power

Table 12. Power specifications

Parameter	Conditions	Specification
Supply current	USB enumeration	< 100 mA
	Continuous mode	150 mA (Note 5)
+5 V _{USER} power available (Note 6)	<ul style="list-style-type: none"> ▪ Connected to self-powered hub ▪ Connected to externally-powered root port hub 	4.5 V minimum, 5.25 V maximum
Output current (Note 7)		350 mA maximum
Fuse F1, (F4 spare)	0452.500 - Littelfuse 0.5A NANO ² ® Slo-Blo [®] Subminiature Surface Mount Fuse	
Fuse F2, (F3 spare)	0452.375 - Littelfuse 0.375A NANO ² ® Slo-Blo [®] Subminiature Surface Mount Fuse	

Note 5: This is the total current requirement for the USB-7202, which includes up to 10 mA for the status LED.

Note 6: "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. If your laptop PC is constrained to the 100 mA maximum, you need to purchase a self-powered hub.

Note 7: This is the total amount of current that can be sourced from the +5 V_{USER} and digital outputs. Fuse for +5V terminal is rated at 375 mA.

General

Table 13. General specifications

Parameter	Specification
Device type	USB 2.0 (full-speed)
Device compatibility	USB 1.1, USB 2.0
DEFAULTS for programmable options and "DEV:RESET/DEFAULT" message	AInScan Low channel = 0 High channel = 0 Samples = 1000 Rate = 1000 Range = ± 10 V Pacer = Disabled (Slave) Transfer mode = BlockIO Trigger = Disabled Status = Idle
	AITrig Trigger polarity = Rising
	CTR Value = 0

Environmental

Table 14. Environmental specifications

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

Mechanical

Table 15. Mechanical specifications

Parameter	Specification
Dimensions	3.55" (L) x 3.75" (W) x 0.5" (H) 4.40" (L) with detachable screw terminals connected
USB cable length	3 meters maximum
User connection length	3 meters maximum

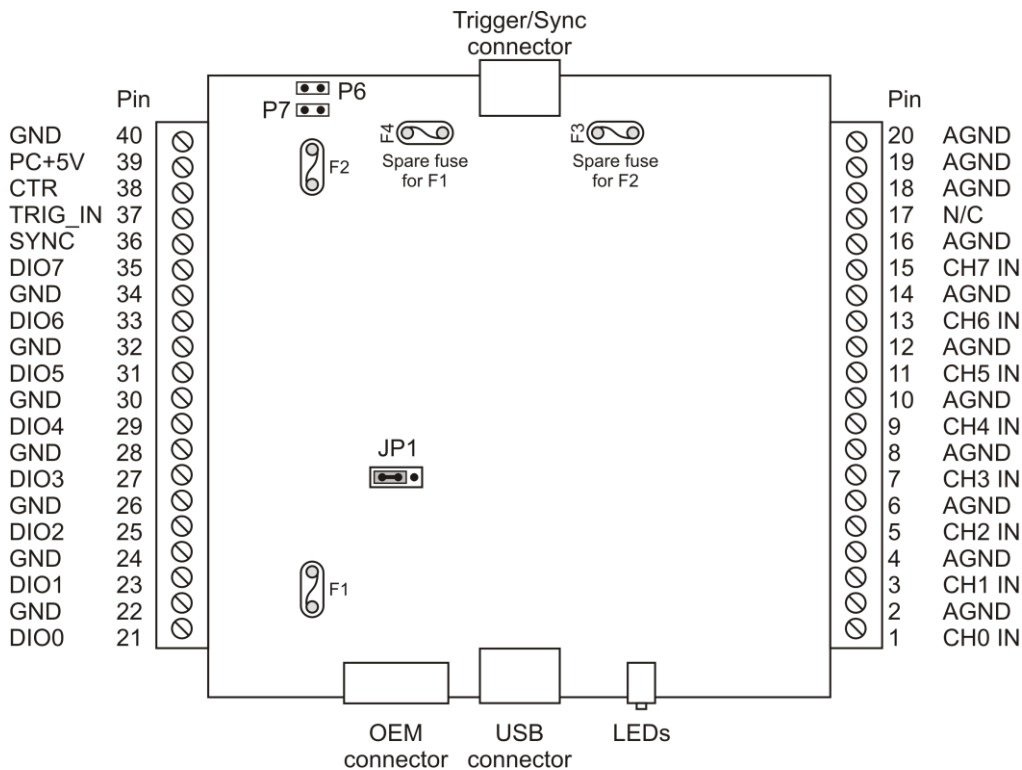
Main connector and pin out

Table 16. Main connector specifications

Parameter	Specification
Connector type	Detachable screw terminal
Wire gauge range	16 AWG to 30 AWG

Table 17. Main connector pin out

Pin	Signal Name	Pin	Signal Name
1	CH0 IN	21	DIO0
2	AGND	22	GND
3	CH1 IN	23	DIO1
4	AGND	24	GND
5	CH2 IN	25	DIO2
6	AGND	26	GND
7	CH3 IN	27	DIO3
8	AGND	28	GND
9	CH4 IN	29	DIO4
10	AGND	30	GND
11	CH5 IN	31	DIO5
12	AGND	32	GND
13	CH6 IN	33	DIO6
14	AGND	34	GND
15	CH7 IN	35	DIO7
16	AGND	36	SYNC
17	N/C (do not connect anything to this pin)	37	TRIG_IN
18	AGND	38	CTR
19	AGND	39	+5V _{USER} output
20	AGND	40	GND



OEM connector and pin out (P4)

Table 18. OEM connector specifications

Parameter	Specification
Connector type	10 position 0.1" box header

Table 19. OEM connector pin out

Pin	Signal Name	Pin	Signal Name
1	N/C	2	V _{BUS} (fuse protected)
3	N/C	4	D-
5	N/C (do not connect anything to this pin)	6	D+
7	N/C (do not connect anything to this pin)	8	GND
9	N/C (do not connect anything to this pin)	10	SHIELD

Trigger/Sync connector and pin out (P5)

Table 20. Trigger/Sync connector specifications

Parameter	Specification
Connector type	10 position 0.1" box header

Table 21. Trigger/Sync connector pin out

Pin	Signal Name	Pin	Signal Name
1	TRIG_IN	2	GND
3	N/C	4	GND
5	SYNC	6	GND
7	N/C	8	GND
9	N/C	10	N/C

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