USB-1208LS

Specifications

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Typical for 25°C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Analog input

Parameter	Conditions	Specification
A/D converter type		Successive approximation type
Input voltage range for linear operation, single-ended mode	CHx to GND	±10 V max
Input common-mode voltage range for linear operation, differential mode	CHx to GND	-10 V min, +20 V max
Absolute maximum input voltage	*CHx to GND*	*±40V max*
Input current (Note 1)	Vin = +10 V	70µA typ
	Vin = 0V	-12µA typ
	Vin = -10 V	-94µA typ
Input impedance		*122K Ohms*
Number of channels		8 single ended / 4 differential, software selectable
Input ranges, single-ended mode		±10V, G=2
Input ranges, differential mode		±20V, G=1 ±10V, G=2 ±5V, G=4 ±4V, G=5 ±2.5V, G=8 ±2.0V, G=10 ±1.25V, G=16 ±1.0V, G=20 Software selectable
Throughput	Software paced	50 S/s
	Continuous scan	1.2 kS/s
	Burst scan to 4 K sample FIFO	8 kS/s
Channel gain queue	Up to 8 elements	Software configurable channel, range, and gain.
Resolution (Note 2)	Differential	12 bits, no missing codes
	Single ended	11 bits
CAL accuracy	CAL = 2.5V	±0.05% typ, ±0.25% max
Integral linearity error		±1 LSB typ
Differential linearity error		±0.5 LSB typ
Repeatability		±1 LSB typ
CAL current	Source	5 mA max
	Sink	20 µA min, 200 nA typ
Trigger Source	Software selectable	External digital: TRIG_IN

Note 1: Input current is a function of applied voltage on the analog input channels. For a given input voltage, Vin, the input leakage is approximately equal to (8.181*Vin-12) µA.

Note 2: The AD7870 converter only returns 11-bits (0-2047 codes) in single-ended mode.

Table 1. Accuracy, differential mode

Range	Accuracy (LSB)
±20 V	5.1
±10 V	6.1
±5 V	8.1
±4 V	9.1
±2.5 V	12.1
±2 V	14.1
±1.25 V	20.1
±1 V	24.1

Table 2. Accuracy, single-ended mode

Range	Accuracy (LSB)
±10 V	4.0

Table 3. Accuracy components, differential mode - all values are (±)

Range	% of Reading	Gain Error at FS (mV)	Offset (mV)	Accuracy at FS (mV)
±20 V	0.2	40	9.766	49.766
±10 V	0.2	20	9.766	29.766
±5 V	0.2	10	9.766	19.766
±4 V	0.2	8	9.766	17.766
±2.5 V	0.2	5	9.766	14.766
±2 V	0.2	4	9.766	13.766
±1.25 V	0.2	2.5	9.766	12.266
±1 V	0.2	2	9.766	11.766

Table 4. Accuracy components, single-ended mode - all values are (±)

Range	% of Reading	Gain Error at FS (mV)	Offset (mV)	Accuracy at FS (mV)
±10 V	0.2	20	19.531	39.531

Analog output

Parameter	Conditions	Specification
D/A converter type		PWM
Resolution		10-bits, 1 in 1024
Maximum output range		*0 -5 Volts*
Number of channels		2 voltage output
Throughput	Software paced	100 S/s single channel mode
		50 S/s dual channel mode
Power on and reset voltage		Initializes to 000h code
Maximum voltage (Note 3)	No load	Vs
	1 mA load	0.99 * Vs
	5 mA load	0.98 * Vs
Output drive	Each D/A OUT	30 mA
Slew rate		0.14 V/mS typ

Note 3: Vs is the USB bus +5V power. The maximum analog output voltage is equal to Vs at no-load. V is system dependent and may be less than 5 volts.

Digital input/output

Digital type	82C55
Number of I/O	16 (Port A0 through A7, Port B0 through B7
Configuration	2 banks of 8
Pull up/pull-down configuration	All pins pulled up to Vs via 47K resistors (default). Positions available for pull down to ground. Hardware selectable via zero ohm resistors as a factory option.
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 = -2.5 mA)	3.0 V min
Output low voltage (IOL = 2.5 mA)	0.4 V max

External trigger

Parameter	Conditions	Specification
Trigger source (Note 4)	External digital	TRIG_IN
Trigger mode	Software selectable	Level sensitive: user configurable for TTL level high or low input.
Trigger latency	Burst	25 µs min, 50 µs max
Trigger pulse width	Burst	40 µs min
Input high voltage		3.0 V min, 15.0 V absolute max
Input low voltage		0.8 V max
Input leakage current		*±1.0 µA*

Note 4: TRIG_IN is protected with a 1.5KOhm series resistor.

Counter

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	*±1 µA*
Maximum input frequency	1 MHz
High pulse width	*500 ns min*
Low pulse width	*500 ns min*
Input low voltage	0 V min, 1.0 V max
Input high voltage	4.0 V min, 15.0 V max

Non-volatile memory

Memory size	8192 bytes		
Memory configuration	**Address Range**	**Access**	**Description**
	0x0000 – 0x17FF	Read/Write	A/D data (4K samples)
	0x1800 – 0x1EFF	Read/Write	User data area
	0x1F00 – 0x1FEF	Read/Write	Calibration data
	0x1FF0 – 0x1FFF	Read/Write	System data

Power

Parameter	Conditions	Specification
Supply current (Note 5)		20 mA
+5V USB power available (Note 6)	Connected to Self-Powered Hub	4.5 V min, 5.25 V max
	Connected to Bus-Powered Hub	4.1 V min, 5.25 V max
Output current (Note 7)	Connected to Self-Powered Hub	450 mA min, 500 mA max
	Connected to Bus-Powered Hub	50 mA min, 100 mA max

Note 5: This is the total current requirement for the USB-1208LS which includes up to 5mA for the status LED.

Note 6: Self-powered refers to USB hubs and hosts with a power supply. Bus-powered refers to USB hubs and hosts without their own power supply.

Note 7: This refers to the total amount of current that can be sourced from the USB +5V, analog outputs and digital outputs.

General

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

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

Mechanical

Dimensions	79 mm (L) x 82 mm (W) x 25 mm (H)
USB cable length	*3 Meters max*
User connection length	*3 Meters max*

Main connector and pin out

Connector type	Screw terminal
Wire gauge range	16 AWG to 30 AWG

4-channel differential mode

Pin	Signal Name	Pin	Signal Name
1	CH0 IN HI	21	Port A0
2	CH0 IN LO	22	Port A1
3	GND	23	Port A2
4	CH1 IN HI	24	Port A3
5	CH1 IN LO	25	Port A4
6	GND	26	Port A5
7	CH2 IN HI	27	Port A6
8	CH2 IN LO	28	Port A7
9	GND	29	GND
10	CH3 IN HI	30	PC+5V
11	CH3 IN LO	31	GND
12	GND	32	Port B0
13	D/A OUT 0	33	Port B1
14	D/A OUT 1	34	Port B2
15	GND	35	Port B3
16	CAL	36	Port B4
17	GND	37	Port B5
18	TRIG_IN	38	Port B6
19	GND	39	Port B7
20	CTR	40	GND

8-channel single-ended mode

Pin	Signal Name	Pin	Signal Name
1	CH0 IN	21	Port A0
2	CH1 IN	22	Port A1
3	GND	23	Port A2
4	CH2 IN	24	Port A3
5	CH3 IN	25	Port A4
6	GND	26	Port A5
7	CH4 IN	27	Port A6
8	CH5 IN	28	Port A7
9	GND	29	GND
10	CH6 IN	30	PC+5V
11	CH7 IN	31	GND
12	GND	32	Port B0
13	D/A OUT 0	33	Port B1
14	D/A OUT 1	34	Port B2
15	GND	35	Port B3
16	CAL	36	Port B4
17	GND	37	Port B5
18	TRIG_IN	38	Port B6
19	GND	39	Port B7
20	CTR	40	GND

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