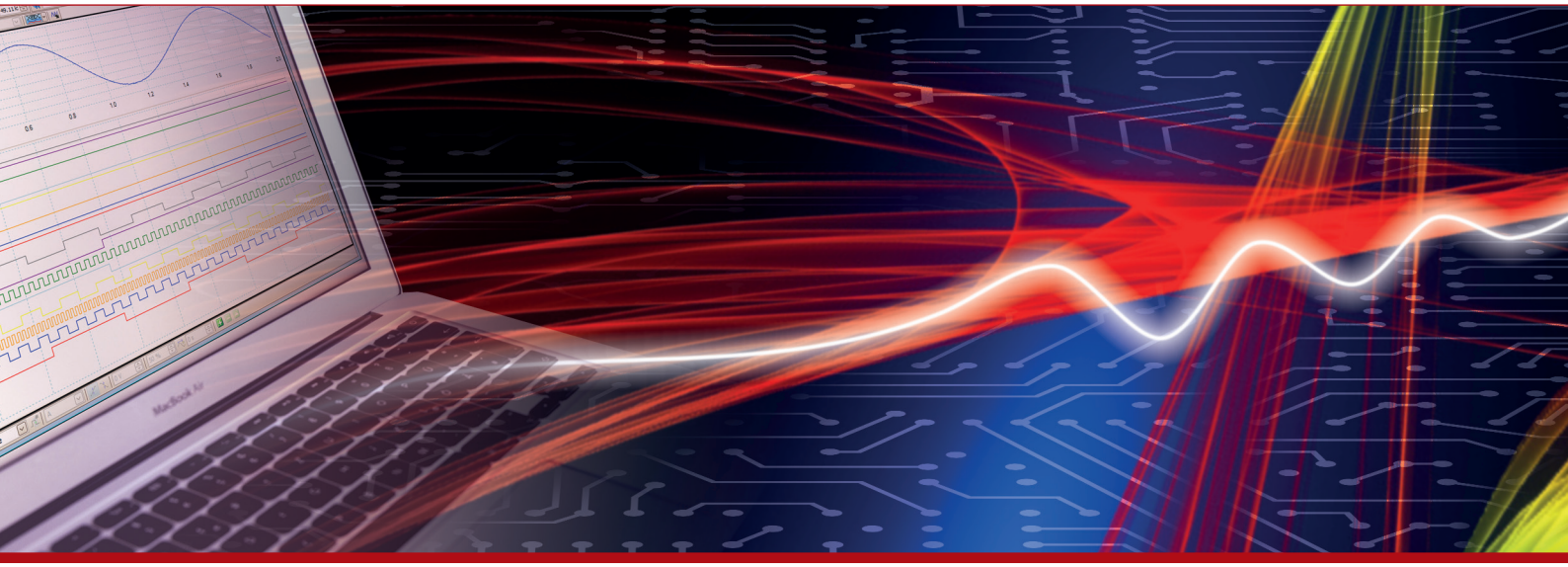
Product Datasheet - Technical Specifications



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Specifications

All specifications are subject to change without notice.
Typical for 25 °C unless otherwise specified.
All specifications apply to all temperature and voltage input channels unless otherwise specified.
Specifications in *italic* text are guaranteed by design.

Analog input

Table 1. General analog input specifications

Parameter	Conditions	Specification
A/D converter type		ADS1256, 24-bit Sigma Delta
A/D data rates		3750 S/s, 2000 S/s, 1000 S/s, 500 S/s, 100 S/s, 60 S/s, 50 S/s, 25 S/s, 10 S/s, 5 S/s, 2.5 S/s
Throughput		▪ Single channel: 2.5 S/s to 1102.94 S/s (software-selectable) ▪ Multiple channels: 0.16 S/s to 551.47 S/s (software-selectable) See Table 11 and Table 12 for details.
Number of channels		16 single-ended or 8 differential (software-selectable). Thermocouples require differential mode. For each channel configured as differential, you essentially lose two single-ended channels.
Input isolation		*500 VDC min between field wiring and USB interface*
Channel configurations		Temperature sensor input, software-selectable to match sensor type
		Voltage input
Input voltage range	Thermocouple mode	±0.078125 V
	Voltage mode (Note 1)	±10 V, ±5 V, ±2.5 V, ±1.25 V, ±0.625 V, ±0.3125 V, ±0.15625 V, ±0.078125 V (software-selectable)
Absolute maximum input voltage	*CxH-CxL relative to GND*	▪ *±22 V max (power on)* ▪ *±10 V max (power off)*
Input impedance		▪ *10 MΩ (power on)* ▪ *390 Ω (power off)*
Input leakage current		*±20 nA*
	Input voltage >±30 V (power on/off)	*±1 µA max*
Input capacitance		590 pf
Maximum working voltage (signal + common mode)	Voltage mode	±10.25 V max
Common mode rejection ratio (Note 1)	*Thermocouple mode, (f_{IN} = 60 Hz)*	*110 dB*
	Voltage mode, (f_{IN} = 60 Hz, all input ranges)	*90 dB*
ADC resolution		24 bits
Crosstalk	Adj chan, differential mode	100 dB
Input coupling		DC
Channel gain queue	Up to 64 elements	Software-selectable channel and range
Warm-up time		45 minutes min
Open thermocouple detect		Software-selectable for each channel.

Parameter	Conditions	Specification
CJC sensor accuracy	*15 °C to 35 °C*	*±0.5 °C typ*
	0 °C to 55 °C	*±1.0 °C max*

Note 1: Placing a notch of the A/D digital filter at 60 Hz (setting A/D data rate = 60 S/s, 10 S/s, 5 S/s or 2.5 S/s) further improves the common mode rejection of this frequency.

Channel configurations

When any item is changed, the firmware stores channel configurations in the EEPROM of the isolated microcontroller. An external application issues commands over the USB to make changes, and the configuration is made non-volatile through the use of the EEPROM.

When connecting differential voltage inputs to a floating voltage source, provide a DC return path from each voltage input to ground. To do this, connect a resistor from each input to an AGND pin. A value of approximately 100 kΩ can be used for most applications. Leave unused input channels either floating or tied to AGND. For each voltage/thermocouple channel configured as differential, you essentially lose one single-ended channel.

Keep source impedances as small as possible to avoid settling time and accuracy errors.

Table 2. Channel configurations

Channel	Category	Specification
CxH/CxL	Thermocouple	8 differential channels
CxH/CxL	Voltage	16 individually-configurable channels that can be configured as either single-ended or 8 differential.
CxH/CxL	Voltage	

Compatible sensors

Table 3. Compatible sensor type specifications

Parameter	Conditions
Thermocouple	J: –210 °C to 1200 °C
	K: –270 °C to 1372 °C
	R: –50 °C to 1768 °C
	S: –50 °C to 1768 °C
	T: –270 °C to 400 °C
	N: –270 °C to 1300 °C
	E: –270 °C to 1000 °C
	B: 0 °C to 1820 °C

Accuracy

Thermocouple measurement accuracy

Thermocouple measurement accuracy specifications include polynomial linearization error, cold-junction compensation measurement error, and are for sample rates up to 60S/s. These specs are for one year, or 3000 operating hours, whichever comes first.

There is a CJC sensor for each terminal block of the module. The accuracy listed below assumes the screw terminals are at the same temperature as the CJC sensor.

The accuracy errors shown do not include the inherent accuracy error of the thermocouple sensor itself. Contact your thermocouple supplier for details on the actual thermocouple sensor accuracy limitations.

Connect thermocouples to the RedLab 2408-2AO such that they are floating with respect to AGND.

When configuring thermocouple sensors, keep any stray capacitance relative to AGND as small as possible to avoid settling time and accuracy errors.

The AGND and DGND pins are isolated from earth ground. You can connect thermocouple sensors to voltages referenced to earth ground as long as isolation between the AGND/DGND pins and earth ground is maintained.

Table 4. Thermocouple accuracy specifications, including CJC measurement error.
All specifications are (±).

Thermocouple	Sensor temperature range	Accuracy error, maximum	Accuracy error, typical	Tempco (°C/°C)
J	–210 °C	2.572 °C	1.416 °C	0.022
	0 °C	0.935 °C	0.469 °C	
	1200 °C	1.869 °C	1.456 °C	
K	–210 °C	2.917 °C	1.699 °C	0.029
	0 °C	1.017 °C	0.526 °C	
	1372 °C	2.478 °C	2.022 °C	
N	–200 °C	3.480°C	2.030 °C	0.029
	0 °C	1.201 °C	0.659 °C	
	1300 °C	1.991 °C	1.600 °C	
R	–50 °C	4.826 °C	3.133 °C	0.082
	250 °C	2.117 °C	1.424 °C	
	1768 °C	2.842 °C	2.347 °C	
S	–50 °C	4.510 °C	2.930 °Co	.089
	250 °C	2.165 °C	1.468 °C	
	1768 °C	3.187 °C	2.597 °C	
B	250 °C	5.489 °C	3.956 °C	0.14
	700 °C	2.283 °C	1.743 °C	
	1820 °C	2.202 °C	1.842 °C	
E	–200 °C	2.413 °C	1.352 °C	0.017
	0 °C	1.069 °C	0.551 °C	
	1000 °C	1.575 °C	1.211 °C	
T	–200 °C	2.821 °C	1.676 °C	0.027
	0 °C	1.050 °C	0.558 °C	
	400 °C	0.957 °C	0.595 °C	

To achieve the thermocouple accuracies listed above, warm up the RedLab 2408-2AO for 45 minutes after the initial power on. The accuracies listed above are only guaranteed if the device is housed in the plastic enclosure.

Analog input DC voltage measurement accuracy

Table 5. DC Accuracy components and specifications. All values are (±)

Range	Gain error (% of reading)	Offset error	INL error (% of range)	Absolute accuracy	Gain temperature coefficient (% reading/°C)	Offset temperature coefficient (µV/°C)
±10 V	0.0037	50 µV	0.0008	500 µV	0.0006	3
±5 V	0.0047	25 µV	0.0008	300 µV	0.0006	2
±2.5 V	0.0059	20 µV	0.0008	200 µV	0.0006	1
±1.25 V	0.0056	20 µV	0.0008	100 µV	0.0006	1
±0.625 V	0.0068	15 µV	0.0005	60 µV	0.0006	1
±0.3125 V	0.0104	15 µV	0.0006	50 µV	0.0006	1
±0.15625 V	0.0184	10 µV	0.0005	40 µV	0.0006	1
±0.078125 V	0.0384	10 µV	0.0009	40 µV	0.0006	1

Input bandwidth

Table 6. input bandwidth

A/D data rate	–3 db Bandwidth (Hz)
3750 S/s	1615
2000 S/s	878
1000 S/s	441
500 S/s	221
100 S/s	44.2
60 S/s	26.5
50 S/s	22.1
25 S/s	11.1
10 S/s	4.42
5 S/s	2.21
2.5 S/s	1.1

Noise performance

For the peak-to-peak noise distribution test, a differential input channel is connected to AGND at the input terminal block, and 50,000 samples are acquired at the maximum rate available at each setting.

Table 7. Peak-to-peak noise performance specifications (µV)

	A/D data rate										
Range	3750 S/s	2000 S/s	1000 S/s	500 S/s	100 S/s	60 S/s	50 S/s	25 S/s	10 S/s	5 S/s	2.5 S/s
±10 V	126.84	100.14	71.76	45.06	30.52	30.52	26.70	19.07	11.92	9.54	9.54
±5 V	56.74	47.56	34.21	25.87	16.21	14.31	14.31	14.30	5.96	4.77	4.77
±2.5 V	32.96	28.79	17.94	14.19	7.51	7.09	7.09	5.72	3.81	4.00	4.00
±1.25 V	18.57	17.52	13.83	9.30	5.48	5.48	5.01	3.81	3.34	3.34	2.86
±0.625 V	18.88	16.58	8.45	7.41	5.32	4.80	4.38	3.86	2.50	2.61	1.98
±0.3125 V	15.33	14.76	8.19	6.94	4.75	4.69	4.49	3.70	3.34	2.56	2.45
±0.15625 V	13.28	16.84	7.47	6.61	5.70	4.48	4.48	4.24	2.66	3.07	2.29
±0.078125 V	13.47	15.02	9.17	6.88	4.28	4.16	4.00	3.57	2.28	2.13	2.40

Table 8. RMS noise performance specifications (µVRMS)

	A/D data rate										
Range	3750 S/s	2000 S/s	1000 S/s	500 S/s	100 S/s	60 S/s	50 S/s	25 S/s	10 S/s	5 S/s	2.5 S/s
±10 V	19.22	15.17	10.87	6.83	4.62	4.62	4.05	2.89	1.81	1.44	1.44
±5 V	8.60	7.21	5.18	3.92	2.46	2.17	2.17	2.16	0.90	0.72	0.72
±2.5 V	4.99	4.36	2.72	2.15	1.14	1.07	1.07	0.87	0.58	0.60	0.60
±1.25 V	2.81	2.66	2.10	1.41	0.83	0.83	0.76	0.58	0.51	0.51	0.43
±0.625 V	2.86	2.51	1.28	1.12	0.81	0.73	0.66	0.58	0.38	0.40	0.30
±0.3125 V	2.32	2.24	1.24	1.05	0.72	0.71	0.68	0.56	0.51	0.39	0.37
±0.15625 V	2.01	2.55	1.13	1.00	0.86	0.68	0.68	0.64	0.40	0.47	0.35
±0.078125 V	2.04	2.28	1.39	1.04	0.65	0.63	0.60	0.54	0.35	0.32	0.36

Table 9. Noise-free resolution specifications (bits)

	A/D data rate										
Range	**3750 S/s**	**2000 S/s**	**1000 S/s**	**500 S/s**	**100 S/s**	**60 S/s**	**50 S/s**	**25 S/s**	**10 S/s**	**5 S/s**	**2.5 S/s**
±10 V	17.2	17.6	18.1	18.7	19.3	19.3	19.5	20.0	20.6	21.0	21.0
±5 V	17.4	17.6	18.1	18.5	19.2	19.4	19.4	19.4	20.6	21.0	21.0
±2.5 V	17.2	17.4	18.1	18.4	19.3	19.4	19.4	19.7	20.3	20.7	21.0
±1.25 V	17.0	17.1	17.4	18.0	18.8	18.8	18.9	19.3	19.5	19.5	19.7
±0.625 V	16.0	16.2	17.1	17.3	17.8	18.0	18.1	18.3	18.9	18.8	19.2
±0.3125 V	15.3	15.3	16.2	16.4	17.0	17.0	17.0	17.3	17.5	17.9	17.9
±0.15625 V	14.5	14.1	15.3	15.5	15.7	16.1	16.1	16.1	16.8	16.9	17.1
±0.078125 V	14.5	14.3	15.0	15.4	16.1	16.2	16.2	16.4	17.0	17.1	16.9

Channel switching error

Table 10. Step response accuracy specifications

	Accuracy										
Range	**3750 S/s**	**2000 S/s**	**1000 S/s**	**500 S/s**	**100 S/s**	**60 S/s**	**50 S/s**	**25 S/s**	**10 S/s**	**5 S/s**	**2.5 S/s**
±10 V	0.0010%	0.0008%	0.0005%	0.0004%	0.0002%	0.0002%	0.0003%	0.0002%	0.0001%	0.0001%	0.0001%
±5 V	0.0009%	0.0008%	0.0004%	0.0004%	0.0003%	0.0002%	0.0002%	0.0002%	0.0001%	0.0001%	0.0001%
±2.5 V	0.0010%	0.0007%	0.0008%	0.0004%	0.0003%	0.0002%	0.0002%	0.0002%	0.0002%	0.0001%	0.0001%
±1.25 V	0.0013%	0.0009%	0.0008%	0.0007%	0.0004%	0.0004%	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%
±0.625 V	0.0022%	0.0016%	0.0011%	0.0011%	0.0007%	0.0007%	0.0005%	0.0005%	0.0004%	0.0005%	0.0003%
±0.3125 V	0.0031%	0.0031%	0.0020%	0.0017%	0.0015%	0.0012%	0.0010%	0.0010%	0.0012%	0.0009%	0.0009%
±0.15625 V	0.0056%	0.0062%	0.0048%	0.0037%	0.0032%	0.0025%	0.0024%	0.0021%	0.0019%	0.0022%	0.0016%
±0.078125 V	0.0114%	0.0123%	0.0076%	0.0070%	0.0041%	0.0051%	0.0046%	0.0036%	0.0032%	0.0030%	0.0034%

Channel switching error is defined as the accuracy that can be expected after one conversion when switching from a channel with a DC input at one extreme of full scale to another channel with a DC input at the other extreme of full scale, expressed in terms of percentage of full scale value.

Throughput rate

The single channel throughput rate is calculated using this formula:

$$Maximum\ throughput = \frac{1}{\frac{1}{data\ rate} + 640\ \mu s}$$

Table 11. Single channel throughput rate specifications

A/D data rate	Maximum throughput (Hz)
3750 S/s	1102.94
2000 S/s	877.19
1000 S/s	609.76
500 S/s	378.79
100 S/s	93.98
60 S/s	57.78
50 S/s	48.45
25 S/s	24.61
10 S/s	9.94
5 S/s	4.98
2.5 S/s	2.50

The multiple-channel throughput rate is calculated using this formula:

$$Maximum\ throughput = \frac{1}{\sum_{n}\left(\frac{1}{data\ rate} + 640\ \mu s\right)}$$, where *n* is the number of channels

Table 12. Multiple-channel throughput rate specifications (Hz)

Number of input channels	3750 S/s	2000 S/s	1000 S/s	500 S/s	100 S/s	60 S/s	50 S/s	25 S/s	10 S/s	5 S/s	2.5 S/s
1	1102.94	877.19	609.76	378.79	93.98	57.78	48.45	24.61	9.94	4.98	2.50
2	551.47	438.60	304.88	189.39	46.99	28.89	24.22	12.30	4.97	2.49	1.25
3	367.65	292.40	203.25	126.26	31.33	19.26	16.15	8.20	3.31	1.66	0.83
4	275.74	219.30	152.44	94.70	23.50	14.45	12.11	6.15	2.48	1.25	0.62
5	220.59	175.44	121.95	75.76	18.80	11.56	9.69	4.92	1.99	1.00	0.50
6	183.82	146.20	101.63	63.13	15.66	9.63	8.07	4.10	1.66	0.83	0.42
7	157.56	125.31	87.11	54.11	13.43	8.25	6.92	3.52	1.42	0.71	0.36
8	137.87	109.65	76.22	47.35	11.75	7.22	6.06	3.08	1.24	0.62	0.31
9	122.55	97.47	67.75	42.09	10.44	6.42	5.38	2.73	1.10	0.55	0.28
10	110.29	87.72	60.98	37.88	9.40	5.78	4.84	2.46	0.99	0.50	0.25
11	100.27	79.74	55.43	34.44	8.54	5.25	4.40	2.24	0.90	0.45	0.23
12	91.91	73.10	50.81	31.57	7.83	4.82	4.04	2.05	0.83	0.42	0.21
13	84.84	67.48	46.90	29.14	7.23	4.44	3.73	1.89	0.76	0.38	0.19
14	78.78	62.66	43.55	27.06	6.71	4.13	3.46	1.76	0.71	0.36	0.18
15	73.53	58.48	40.65	25.25	6.27	3.85	3.23	1.64	0.66	0.33	0.17
16	68.93	54.82	38.11	23.67	5.87	3.61	3.03	1.54	0.62	0.31	0.16

Analog voltage output

Unused AOUTx output channels should be left disconnected.

The RedLab 2408-2AO output voltage level defaults to 0 V whenever the host PC is reset, shut down or suspended, or if a reset command is issued to the device.

The outputs may have a transient during startup. The duration of the output transient depends highly on the enumeration process of the host PC. Typically, the output of the RedLab 2408-2AO is stable after two seconds.

Table 13. RedLab 2408-2AO analog voltage output specifications

Parameter	Conditions	Specifications
Digital-to-analog converter		DAC8552
Number of channels		2
Resolution		16 bits
Output ranges	Calibrated	±10 V
	Uncalibrated	±10.05 V (software-selectable)
Output transient	Host PC is reset, powered on, suspended or a reset command is issued to device	Duration: 2 s Amplitude: 2 V p-p
	Initial power on	Duration: 50 ms Amplitude: 5 V peak
Differential non-linearity		±0.25 LSB typ ±1 LSB max
Output current	AOUTx pins	±5.0 mA max
Output short-circuit protection	AOUTx connected to AGND	Unlimited duration

Parameter	Conditions	Specifications
Output coupling		DC
Power on and reset state		DACs cleared to zero-scale: 0 V, ±50 mV
Output noise		60 μV_{rms} (BW=1.5 KHz)
Settling time	*To rated accuracy, 10 V step*	75 µS
Slew rate		*1.0 V/µs*
Throughput	Single-channel	1000 S/s max, system-dependent, 0.01 S/s min
	Multichannel	1000 S/s / #ch max, system-dependent, 0.01 S/s min

Table 14. Calibrated absolute accuracy specifications

Range	Accuracy (±LSB)
±10 V	16.0

Table 15. Calibrated absolute accuracy components specifications

Range	% of reading	Offset (±mV)	Temp drift (%/°C)	Absolute accuracy at FS (±mV)
±10 V	±0.0183	1.831	0.00055	3.661

Table 16. Relative accuracy specifications

Range	Relative accuracy (±LSB)
±10 V	4.0 typ

Analog input/output calibration

Table 17. Analog input/output calibration specifications

Parameter	Specifications
Recommended warm-up time	45 minutes min
Calibration	Firmware calibration
Calibration interval	1 year
AI calibration reference	+10.000 V, ±5 mV max. Actual measured values stored in EEPROM
	Tempco: 5 ppm/°C max
	Long term stability: 30 ppm/1000 hours
AO calibration procedure	The analog output pin is internally routed to the analog input pin.
AOUTx readback	Each AOUT*x* output can be independently measured by the onboard A/D converter. Software-selectable

Digital input/output

Table 18. Digital input specifications

Parameter	Specifications
Number of I/O	8 channels
Configuration	Each DIO bit can be independently read from (DIN) or written to (DOUT). The DIN bits can be read at any time whether the DOUT is active or tri-stated.
Input voltage range	0 to +15 V
Input type	CMOS (Schmitt trigger)

Parameter	Specifications
Input characteristics	47 kΩ pull-up/pull-down resistor, 28 kΩ series resistor
Maximum input voltage range	*0 V to +20 V max (power on/off, relative to DGND)* (Note 2)
Pull-up/pull-down configuration	All pins pulled up to +5 V via individual 47 kΩ resistors (the J6 shorting block default position is pins 1 and 2). Pull down capability is available by placing the J6 shorting block across pins 2 and 3.
Transfer rate (software paced)	500 port reads or single bit reads per second typ.
Input high voltage	1.3 V min, 2.2 V max
Input low voltage	1.5 V max, 0.6 V min
Schmitt trigger hysteresis	0.4 V min, 1.2 V max

Note 2: DGND pins are recommended for use with digital input and digital output pins. The DGND and AGND pins are common and are isolated from earth ground.

Table 19. Digital output specifications

Parameter	Specifications
Number of I/O	8 channels
Configuration (Note3)	Each DIO bit can be independently read from (DIN) or written to (DOUT). The DIN bits may be read at any time whether the DOUT is active or tri-stated
Output characteristics (Note 4)	47 kΩ pull-up, open drain (DMOS transistor)
Pull-up configuration	All pins pulled up to +5 V via individual 47 kΩ resistors (the J6 shorting block default position is pins 1 and 2).
Transfer rate (software paced)	Digital output – 500 port writes or single-bit writes per second typ.
Output voltage range	0 V to +5 V (no external pull up resistor, internal 47 kΩ pull-up resistors connected to +5 V by default) 0 V to +15 V max (Note 5)
Drain to source breakdown voltage	+50 V min
Off state leakage current (Note 6)	1.0 µA
Sink current capability	▪ 150 mA max (continuous) per output pin ▪ 150 mA max (continuous) for all eight channels
DMOS transistor on-resistance (drain to source)	4 Ω

Note 3: DGND pins are recommended for use with digital input and digital output pins. The DGND and AGND pins are common and are isolated from earth ground.

Note 4: Each DMOS transistor source pin is internally connected to DGND.

Note 5: The external pull-up is connected to the digital output bit through an external pull-up resistor. Adding an external pull-up resistor connects it in parallel with the internal 47 kΩ pull-up resistor of that particular digital input/output bit. Careful consideration should be made when considering the external pull-up resistor value and the resultant pull-up voltage produced at the load.

Note 6: Does not include the additional leakage current contribution that may occur when using an external pull-up resistor.

Counter

Table 20. CTR specifications

Parameter	Conditions	Specification
Pin name		CTR0, CTR1
Number of channels		2 channels
Resolution		32-bits
Counter type		Event counter
Input type		Schmitt trigger, rising edge triggered
Input source		CTR0 (pin 44) CTR1 (pin 42)
Counter read/writes rates (software paced)	Counter read	System dependent, 500 reads per second.
	Counter write	System dependent, 500 writes per second.
Input characteristics	Each CTRx input pin	562 kΩ pull-up resistor to +5 V, 10 kΩ series resistor
Input voltage range		±15 V max
Max input voltage range	*CTR0,CTR1 relative to AGND and DGND (Note 7)*	*±20 V max (power on/off)*
Input high voltage		1.3 V min, 2.2 V max
Input low voltage		1.5 V max, 0.6 V min
Schmitt trigger hysteresis		0.4 V min, 1.2 V max
Input bandwidth (–3 dB)		1 MHz
Input capacitance		*25 pf*
Input leakage current		*±120 nA@5 V, ±1.6 mA@±15 V*
Input frequency		1 MHz, max
High pulse width		*500 ns, min*
Low pulse width		*500 ns, min*

Note 7: DGND pins are recommended for use with counter input pins. The DGND and AGND are common and are isolated from earth ground.

Memory

Table 21. Memory specifications

EEPROM	4096 bytes isolated micro reserved for sensor configuration 256 bytes USB micro for external application use

Microcontroller

Table 22. Microcontroller specifications

Type	One high-performance 8-bit RISC microcontroller with USB interface (non-isolated) One high-performance 16-bit RISC microcontroller for measurements (isolated)

Power

Table 23. Power specifications

Parameter	Conditions	Specification
Supply current (Note 8)	Quiescent current	275 mA
Voltage supervisor limits	4.5 V > V_{ext} or V_{ext} > 5.5 V	PWR LED = Off; (power fault)
	4.5 V < V_{ext} < 5.5 V	PWR LED = On
+5 V user output voltage range	Available at terminal block pin 40	4.75 V min to 5.25 V max
+5 V user output current	Available at terminal block pin 40	10 mA max
Isolation	Measurement system to PC	500 VDC min

Note 8: This is the total quiescent current requirement for the RedLab 2408-2AO which includes up to 10 mA for the status LED. This does not include any potential loading of the digital I/O bits, +5 V user terminal or the AOUTx outputs.

USB specifications

Table 24. USB specifications

Parameter	Specifications
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

Environmental

Table 25. Environmental specifications

Parameter	Specifications
Operating temperature range	0 °C to 50 °C max
Storage temperature range	–40 °C to 85 °C max
Humidity	0 to 90% non-condensing max

Mechanical

Table 26. Mechanical specifications

Parameter	Specifications
Dimensions (L x W x H)	127 × 89.9 × 35.6 mm (5.00 x 3.53 x 1.40 in.)
User connection length	3 meters max

Screw terminal connector type and pinout

Table 27. Screw terminal connector specifications

Connector type	Fixed screw terminal
Wire gauge range	16 AWG to 30 AWG

Screw terminal pinout

Table 28. 8-channel differential mode pinout

Pin	Signal name	Pin description	Pin	Signal name	Pin description
1	CH0H	Channel 0 HI	23	AGND	Analog ground
2	CH0L	Channel 0 LO	24	CH7L	Channel 7 LO
3	AGND	Analog ground	25	CH7H	Channel 7 HI
4	CH1H	Channel 1 HI	26	AGND	Analog ground
5	CH1L	Channel 1 LO	27	CH6L	Channel 6 LO
6	AGND	Analog ground	28	CH6H	Channel 6 HI
7	CH2H	Channel 2 HI	29	AGND	Analog ground
8	CH2L	Channel 2 LO	30	CH5L	Channel 5 LO
9	AGND	Analog ground	31	CH5H	Channel 5 HI
10	CH3H	Channel 3 HI	32	AGND	Analog ground
11	CH3L	Channel 3 LO	33	CH4L	Channel 4 LO
12	AGND	Analog ground	34	CH4H	Channel 4 HI
13	DGND	Digital ground	35	AGND	Analog ground
14	DIO0	Digital input/output	36	AOUT1	Analog output 1
15	DIO1	Digital input/output	37	AGND	Analog ground
16	DIO2	Digital input/output	38	AOUT0	Analog output 0
17	DIO3	Digital input/output	39	CHAS	Chassis ground
18	DIO4	Digital input/output	40	+5V	+5 V output
19	DIO5	Digital input/output	41	DGND	Digital ground
20	DIO6	Digital input/output	42	CTR1	Counter 1
21	DIO7	Digital input/output	43	DGND	Digital ground
22	DGND	Digital ground	44	CTR0	Counter 0

Table 29. 16-channel single-ended mode pinout

Pin	Signal name	Pin description	Pin	Signal name	Pin description
1	CH0	Channel 0	23	AGND	Analog ground
2	CH8	Channel 8	24	CH15	Channel 15
3	AGND	Analog ground	25	CH7	Channel 7
4	CH1	Channel 1	26	AGND	Analog ground
5	CH9	Channel 9	27	CH14	Channel 14
6	AGND	Analog ground	28	CH6	Channel 6
7	CH2	Channel 2	29	AGND	Analog ground
8	CH10	Channel 10	30	CH13	Channel 13
9	AGND	Analog ground	31	CH5	Channel 5
10	CH3	Channel 3	32	AGND	Analog ground
11	CH11	Channel 11	33	CH12	Channel 12
12	AGND	Analog ground	34	CH4	Channel 4
13	DGND	Digital ground	35	AGND	Analog ground
14	DIO0	Digital input/output	36	AOUT1	Analog output 1
15	DIO1	Digital input/output	37	AGND	Analog ground
16	DIO2	Digital input/output	38	AOUT0	Analog output 0
17	DIO3	Digital input/output	39	CHAS	Chassis ground
18	DIO4	Digital input/output	40	+5V	+5 V output
19	DIO5	Digital input/output	41	DGND	Digital ground
20	DIO6	Digital input/output	42	CTR1	Counter 1
21	DIO7	Digital input/output	43	DGND	Digital ground
22	DGND	Digital ground	44	CTR0	Counter 0

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