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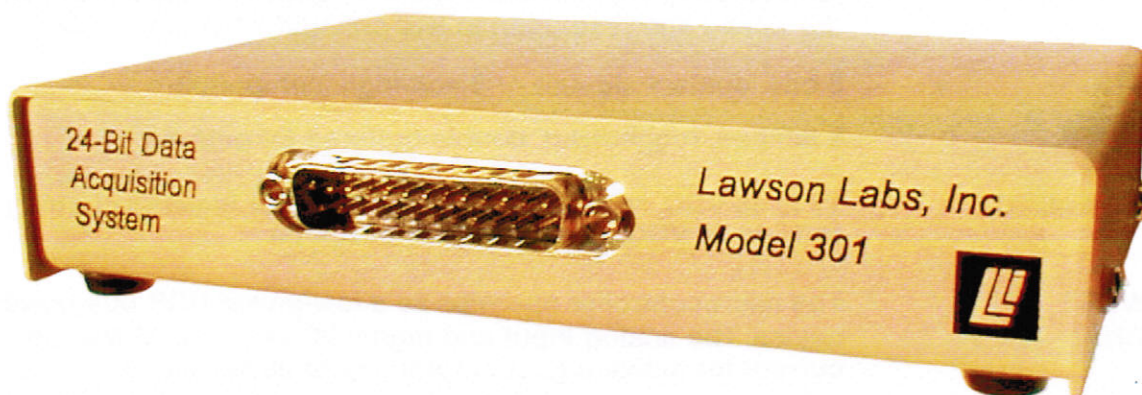
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MODEL 301 24-Bit Delta-Sigma USB Data Acquisition System

The Model 301 is a complete, Delta-Sigma high-resolution data acquisition system for the Universal Serial Bus (USB). It serves as a general purpose A/D converter or as a built-in interface for a wide variety of instrumentation. Up to 32 Model 301s can be connected to a single USB port using inexpensive hubs. Two analog input channels are provided, along with eight digital inputs and eight digital outputs.

Lawson Labs has been designing and building high-resolution Delta-Sigma data acquisition systems since 1991. The Model 301 represents our sixth generation of Delta-Sigma design. It incorporates the optical isolation and input protection that have long allowed our high resolution systems to function reliably in the industrial environment.



The analog input range is ± 5 volts, true differential. The maximum single-channel data rate is 1000 Hz at just under 21 bits effective resolution. Both channels can be scanned at 100 Hz with effective resolution of 20 bits. As the unit is slowed down, it quickly gains effective bits to 22 bits at 200 Hz and 23 at 50 Hz for single-channel operation. The input impedance is 10^{13} and the DC common mode rejection is typically 100 dB. The isolated portion of the Model 301 operates from a single unregulated, low-power supply.

Drivers are provided for Win98, with VC and VB sample application code. Win2000 drivers are available on request. The VB sample code includes a real-time graphic presentation of single-channel scanning data, and is powerful enough for many general purpose data logging applications. Multiple A/Ds can be split between 32 applications, or all used by one, or anything in between. Units can be connected or disconnected on the fly, without interrupting other ongoing acquisition. In order to obtain fully independent operation, even under fault conditions, it was beneficial for us to write our own low level USB device drivers. These drivers should provide high-reliability operation for critical acquisition tasks.



Model 301 SPECIFICATIONS

A/D TYPE:	24-bit Delta-Sigma converter with microcontroller supervisor and optical isolation		
MONOTONICITY:	23 bits		
LINEARITY:	+/-0.002% of full scale		
DIFFERENTIAL INPUT RANGE:	+/-5 volts		
DC COMMON MODE RANGE:	+/-6.5 volts		
DC COMMON MODE REJECTION:	-100 dB typical		
ANALOG INPUTS:	2, true differential protected to +/-60 volts		
INPUT IMPEDANCE:	10 ¹³ ohms typical		
PROGRAMMABLE DATA RATE:	50 to 1000 Hz, lower rates are obtained via digital averaging		
EFFECTIVE RESOLUTION:	Effective resolution is defined as total resolution in bits minus RMS noise in bits. Figures below use an oversampling ratio of four.		
	Rate	Effective Resolution in Bits	
	600	21	
	200	22	
	50	23	
SCANNING MODE:	Single, or two-channel scanning mode available. Rates are crystal-controlled for accurate timing. Divide rates above by 10 for speed and resolution in two-channel scanning mode.		
DIGITAL INPUTS:	8 bits, contact closure or 5 volt logic compatible		
DIGITAL OUTPUTS:	8 latched, ruggedized, double-buffered 5V outputs		
POWER REQUIREMENT:	11 to 15 VDC, regulated or unregulated, for isolated circuitry or 15 to 30 VDC with pre-regulator option		
TYPICAL POWER CONSUMPTION:	The microcontroller operates as a low-power USB bus-powered device. The analog input and digital I/O requires 25 MA (add drive current for active digital outputs, up to 20 MA each)		
SIZE:	Board only	5.5 x 3.7 x 0.75 inches	
	Enclosure	6.0 x 4.2 x 1.25 inches	
SINGLE-PIECE PRICE:	\$350 board with disk only		
OPTIONS:	Starter kit, includes wall-mount power supply, manual, USB cable and matching connector with hood		\$ 25
	Enclosure		\$ 60
	Power Supply Pre-regulator		\$ 15
PACKAGE PRICE:	Includes all options above		\$425
OTHER OPTIONS:	Custom Input Range (consult factory)		\$ 25
	25-Pin Screw Terminal Adapter		\$ 25