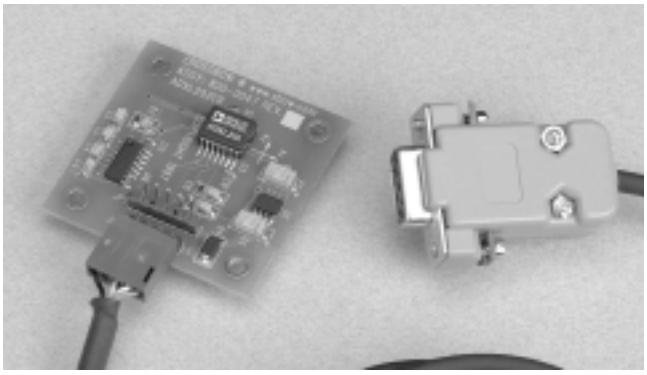
XL202 Evaluation Board with RS-232 Interface and Datalogging.

ADXL202EB-232

FEATURES
Evaluation board with ADXL202, Microchip 16C63
Two axis acquisition of acceleration or tilt information
PC Data acquisition software
20Hz Sample Rate
Powered from RS-232 Port
Datalogging Capability



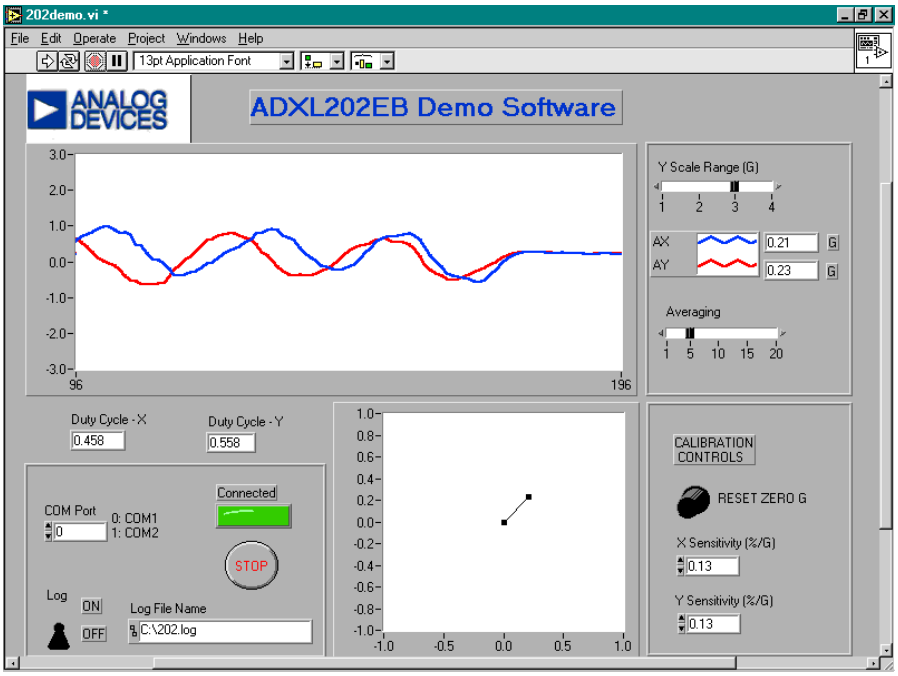
GENERAL DESCRIPTION

The ADXL202EB-232 is an evaluation board for the ADXL202 dual axis, 2 g accelerometer. The board demonstrates the ADXL202 interface to a low cost microcontroller, the Microchip 16C63, and is configured to read the PWM signals from the ADXL202, process them and convert them to a serial protocol for communication to a PC RS-232 port. Software is provided to read the RS-232 port and display real time acceleration data. A data logging feature is also included, so that data can be stored for later evaluation by a spreadsheet or other tool.

The evaluation board is designed specifically to help the designer understand accelerometers and specifically how the ADXL202 may work in the application, without the need to design HW or SW. The firmware for the Microchip microcontroller and recommended firmware for other microcontrollers is available for free on the Analog Devices Website, (www.analog.com/imems/)

APPLICATIONS

- Development of New Applications
  - Computer Peripherals
  - Earthquake detectors
  - Alarms and motion detectors
  - Battery powered motion sensing
- 2 Axis tilt sensing with faster response than electrolytic, mercury or thermal sensors
- Datalogging
- Instrumentation



DETAILED DESCRIPTION

The ADXL202EB-232 is a dual axis RS-232 output digital accelerometer. The ADXL202EB-232 consists of the ADXL202JQC and the Microchip 16C63 microcontroller. The ADXL202 digital outputs are read using the timer / counter port of the microcontroller. The signals are converted from high and low times to a duty cycle in %. The X and Y duty cycle values are outputted when requested . The board is powered by an extra control signal on the RS-232 port or external unregulated power. The voltage regulator is the low power ADM666.

J1	Primary Connector, Serial Port Cable Plugs into J1
1	Power In - 6-12 Vdc unregulated, connected to RTS line of serial port
2	Transmit Data / RS-232 Out
3	Receive Data / RS-232 In
4	No Connect
5	Ground
J2	Secondary Connector, Analog and PWM signals
1	Power In - 6 - 12 Vdc
2	XFILT
3	YFILT
4	XOUT
5	YOUT
6	Ground

SOFTWARE INSTALLATION

The product works on any Win95, NT or Win 3.1 computer. The software is contained in a self-extractable zip file. Installation instructions are provided in a read-me file on the included CD ROM. Note that the software is also available on the website at www.analog.com/imems/.

HARDWARE INSTALLATION

Connect the RS-232 cable to an available RS-232 COM port on your PC. Connect the demo board to the cable via the keyed connector.

SET UP

Running Arrow: When the software loads, the running arrow button is in the run state. If the sensor is not yet hooked up, press stop. When the sensor board is attached to the correct communications port and the led has finished flashing, press the running arrow button at the top left corner. Alternatively press CTRL-R on the key pad. The arrow should change shape to indicate running.

Connected LED

If the board is communicating with the software properly, the Connected LED illuminates Green.

Stop Button

The stop button stops the software. Press the running arrow to restart. If logging switch is on, data is logged immediately after the running arrow is pressed.

Com Port

Enter the communications port which the sensor is connected to. Enter 0 for COM1 and 1 for COM2. Typically notebooks the sensor is connected to COM1 and for desktops COM2.

Calibration

Reset Zero-G: The Reset Zero-G button allows you to set the current reading to the zero-G value. Set the unit still and on a flat surface (optional). Press the reset zero-g button and the display will center around zero. If the button is not pressed, the software assumes a zero-g duty cycle of 50%.

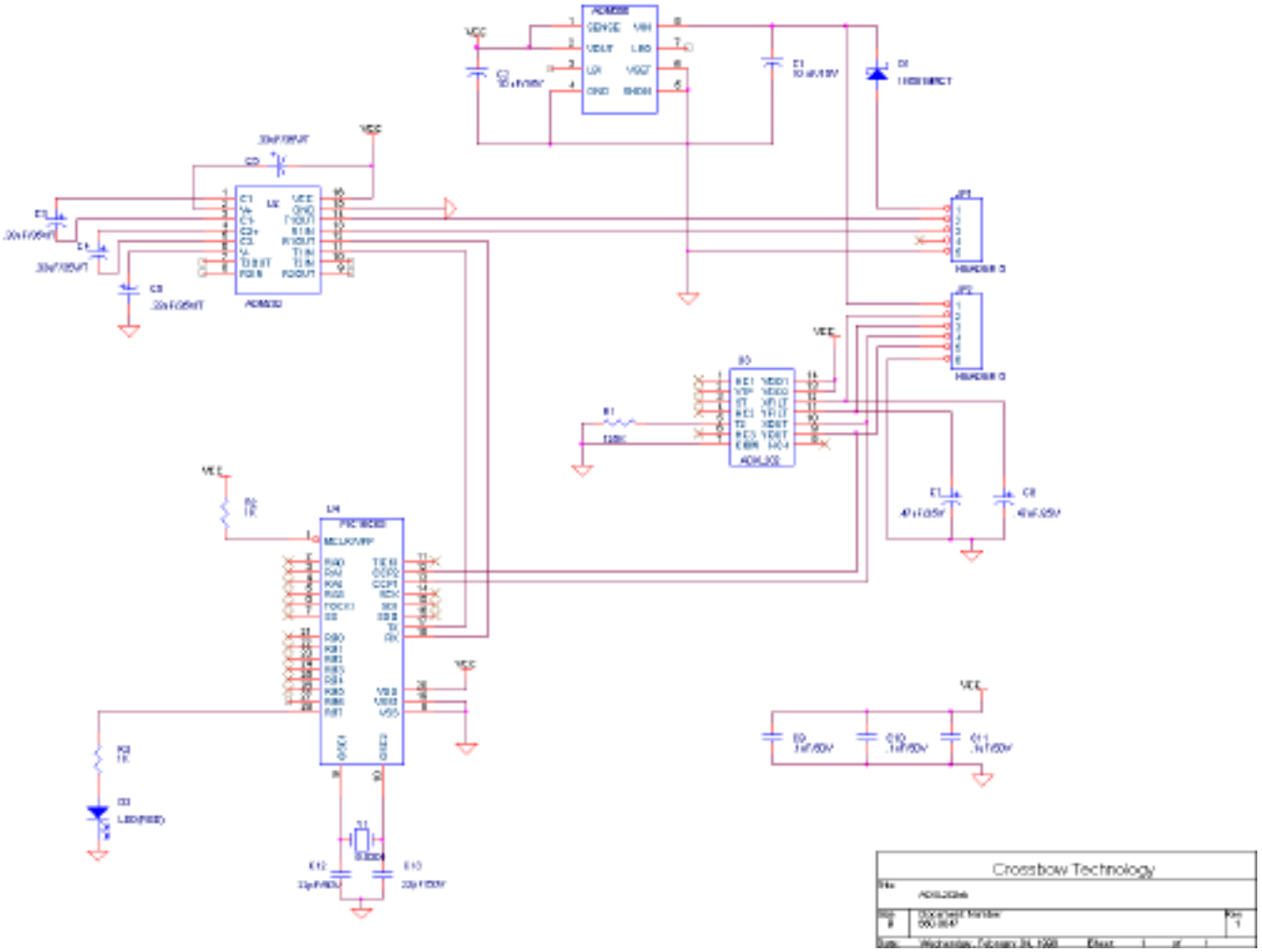
X-Sensitivity, Y-Sensitivity: The sensitivity controls adjust the conversion of the duty cycle output to G's. After pressing the Reset Zero-G, move X sensor into a 1 G full scale orientation (i.e., point the X axis parallel to the Gravity vector), then adjust X-Sensitivity control until the readout displays 1.0 G. Repeat for the Y-axis. Note the software DOES NOT save the values, so you may want to write them down.

Data Logging

Logging saves the raw X,Y duty cycle to file. Logging can be turned on and off at anytime. The file name and path is shown. Change the file name and path at any time. Data is always appended to file. Data is never lost, but confusion can occur if new file names are not used between tests. Change the file name for each test.

Screen Display

The main display shows the X and Y acceleration in G's. When the software loads default calibration data of 50% for zero-G duty cycle and 12%/G for sensitivity are used in the conversion of duty cycle to G. The raw duty cycle data is displayed below the graph. Use the calibration controls to adjust these values. The actual accelerations are displayed in the digital display on the legend.



Y Scale Range
The Y scale selector sets the full scale range of the display between 0.5 and 4 G full scale. A 3G full scale is the default.

Compass / Vector Display
The compass / vector display plots the Y acceleration vs. the X acceleration. This is a 2 dimensional vector with origin at 0,0. The acceleration vector is useful in seismic and tilt applications.

Averaging
Software averaging improves ripple rejection; however it slows the display update. Adjust the setting to the application requirements. The default setting is 5 averages.

COMMUNICATIONS PROTOCOLS
The default RS-232 parameters are 9600 baud, 8 data bits, 1 start bit, no stop bits. The RS-232 protocol consists of a single ASCII command 'G' which returns a 6 byte data packet. The data packet consists of a header, data, and a checksum byte. See Tables 1,2, and 3.

Table 1: Data Commands

ASCII	Binary	Description
G	71	Request data

Table 2: Packet Structure

Byte Number	Value	Description
1	0-255	X Axis MSB
2	0-255	X Axis LSB
3	0-255	Y Axis MSB
4	0-255	Y Axis LSB

Table 3: Data Encoding

PWM % = (256 * MSB + LSB) / 100.0

COMPONENTS
The demo board consists of an ADXL202 accelerometer, a 16C63 Microchip microcontroller, an ADM666 for voltage regulation of the RS-232 DTS signal, an ADM232 for RS232 interface, and a crystal. Note that many of these components are required only to support the RS-232 interface. In a stand-alone, (non-232) board, often only the ADXL202 and the Microchip controller will be needed.