

DUAL-AXIS INCLINOMETER

Glen Akins, KCOVXL



ANALOG DEVICES ADIS16201

Dual-Axis Inclinometer



DUAL-AXIS

One chip capable of measuring both tilt and roll.



DIGITAL INTERFACE

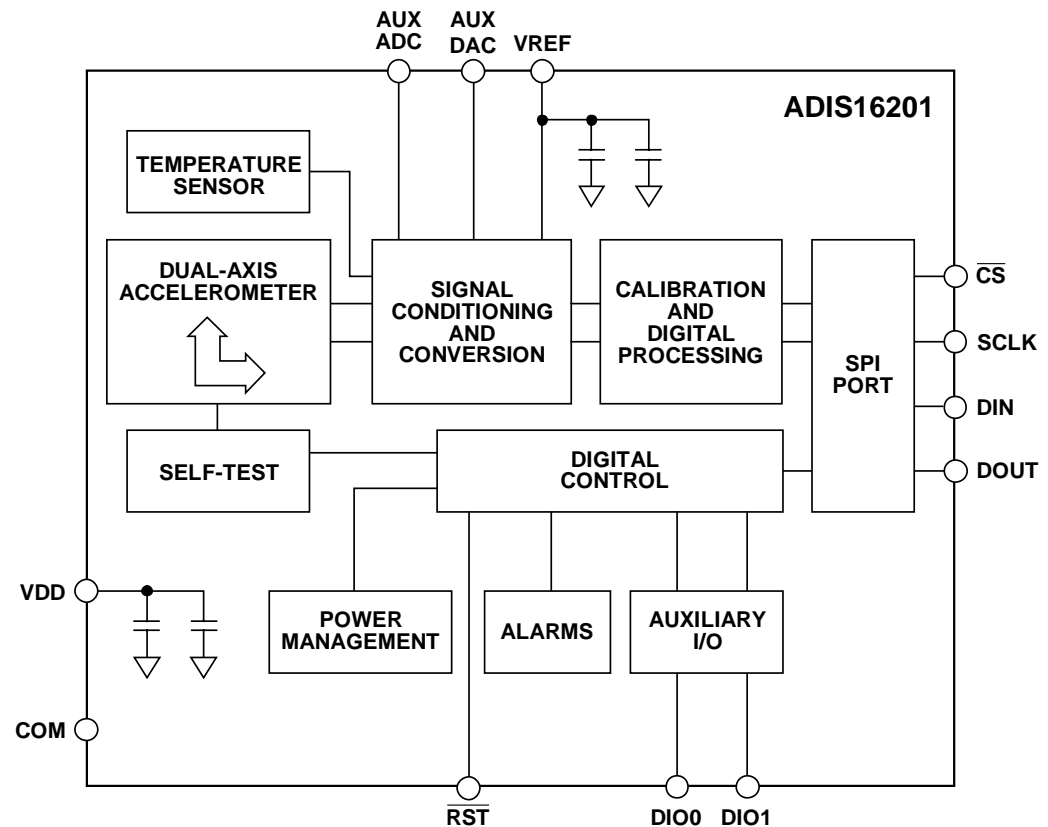
All signal conditioning and analog-to-digital conversion performed on-chip.



DIRECT ANGLE OUTPUT

Acceleration due to gravity converted to incline angles on-chip.

FUNCTIONAL BLOCK DIAGRAM



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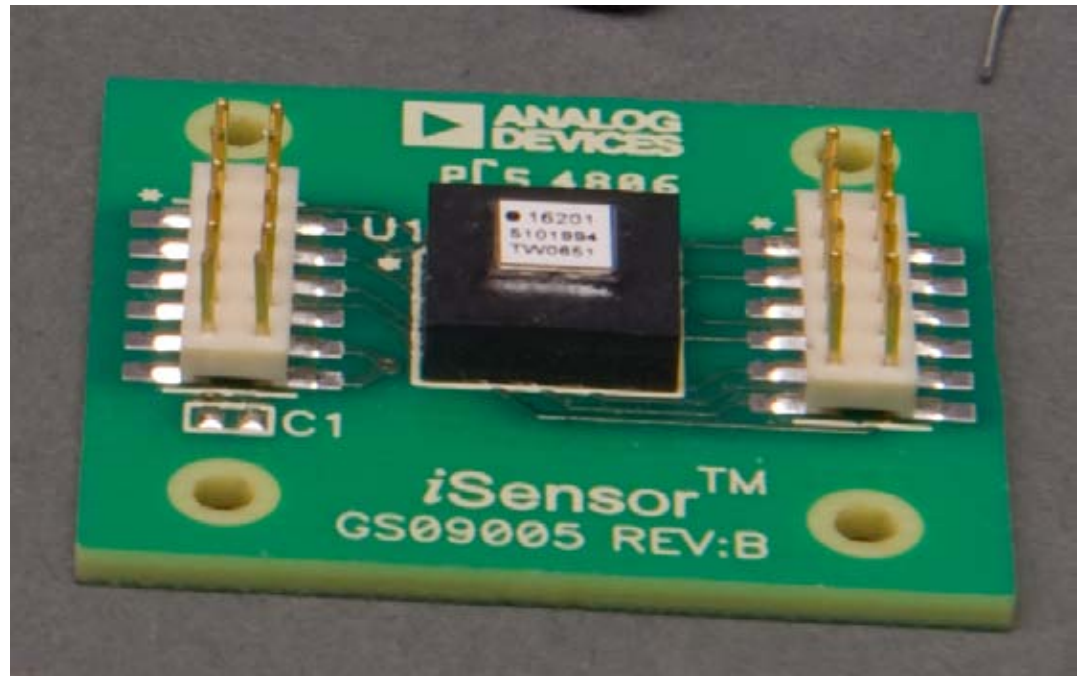
Dual-Axis Inclinometer



DIFFICULT TO SOLDER PACKAGE

Solution: Use evaluation board.

Downside: Expensive!



DESIGN PROCESS

Dual-Axis Inclinometer



1. BLOCK DIAGRAM



3. SCHEMATIC



5. MECHANICAL



2. LIBRARIES



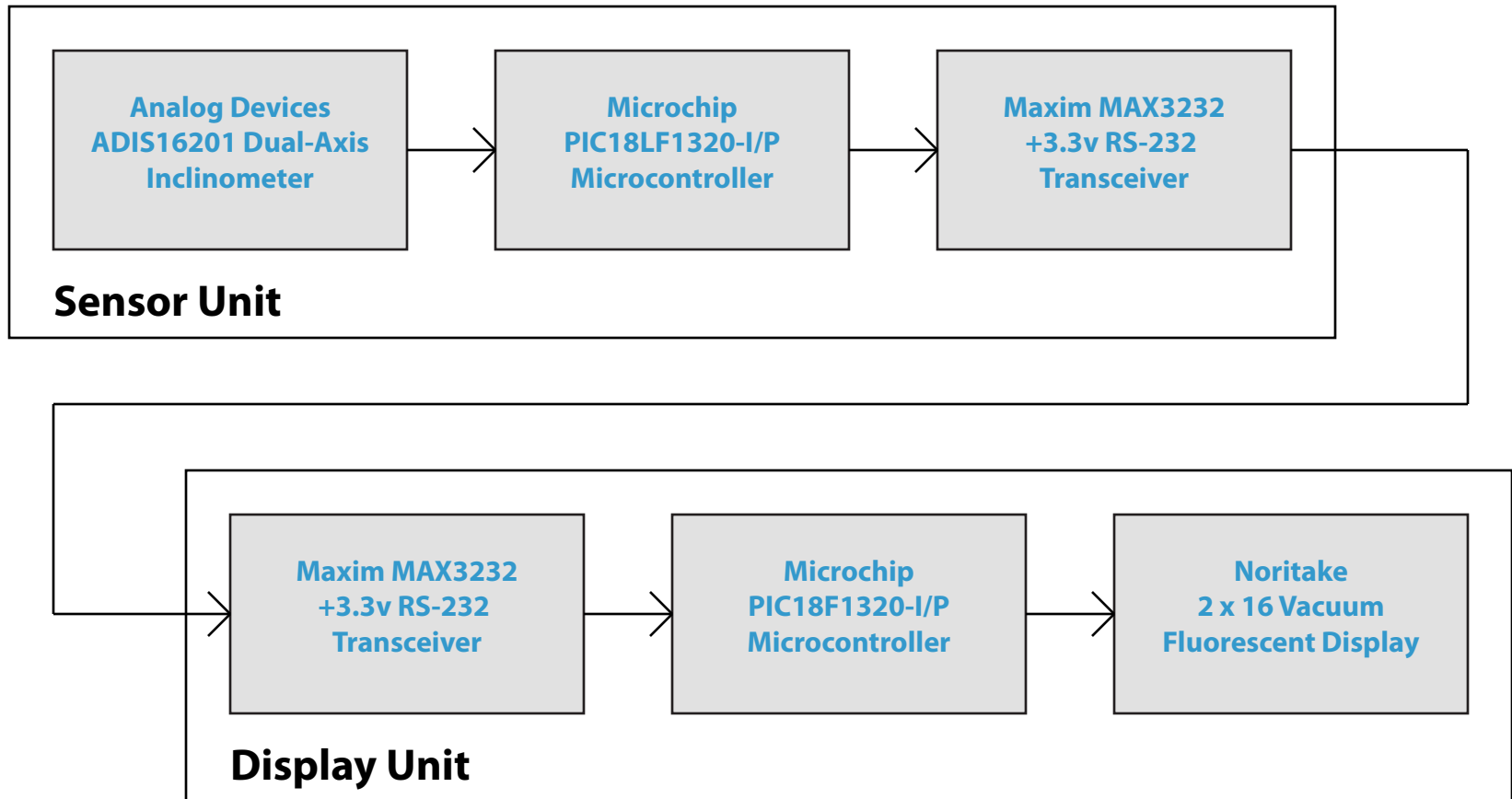
4. BOARD LAYOUT



6. SOFTWARE

BLOCK DIAGRAM

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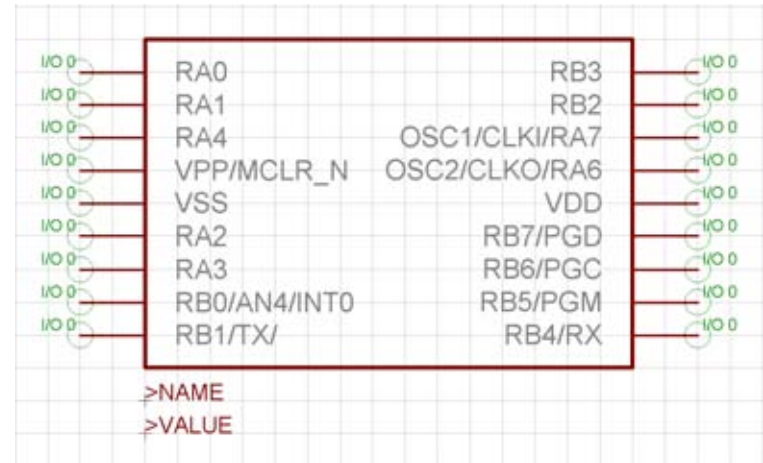
LIBRARIES

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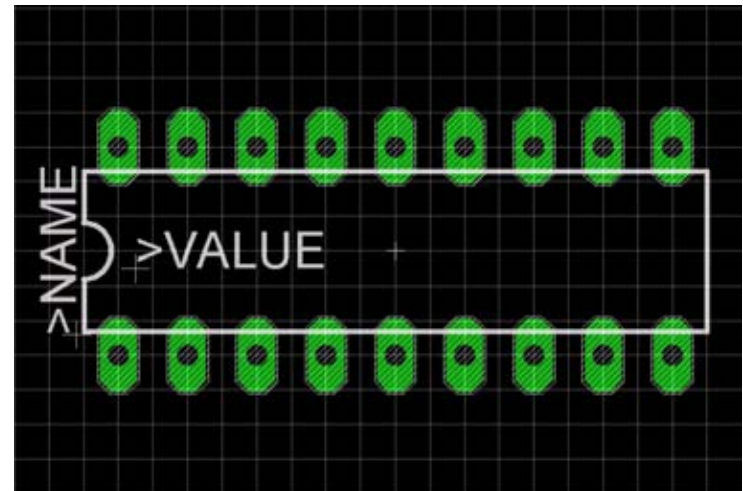
SCHEMATIC SYMBOL

Displayed on schematic.
Represents logical function of device.



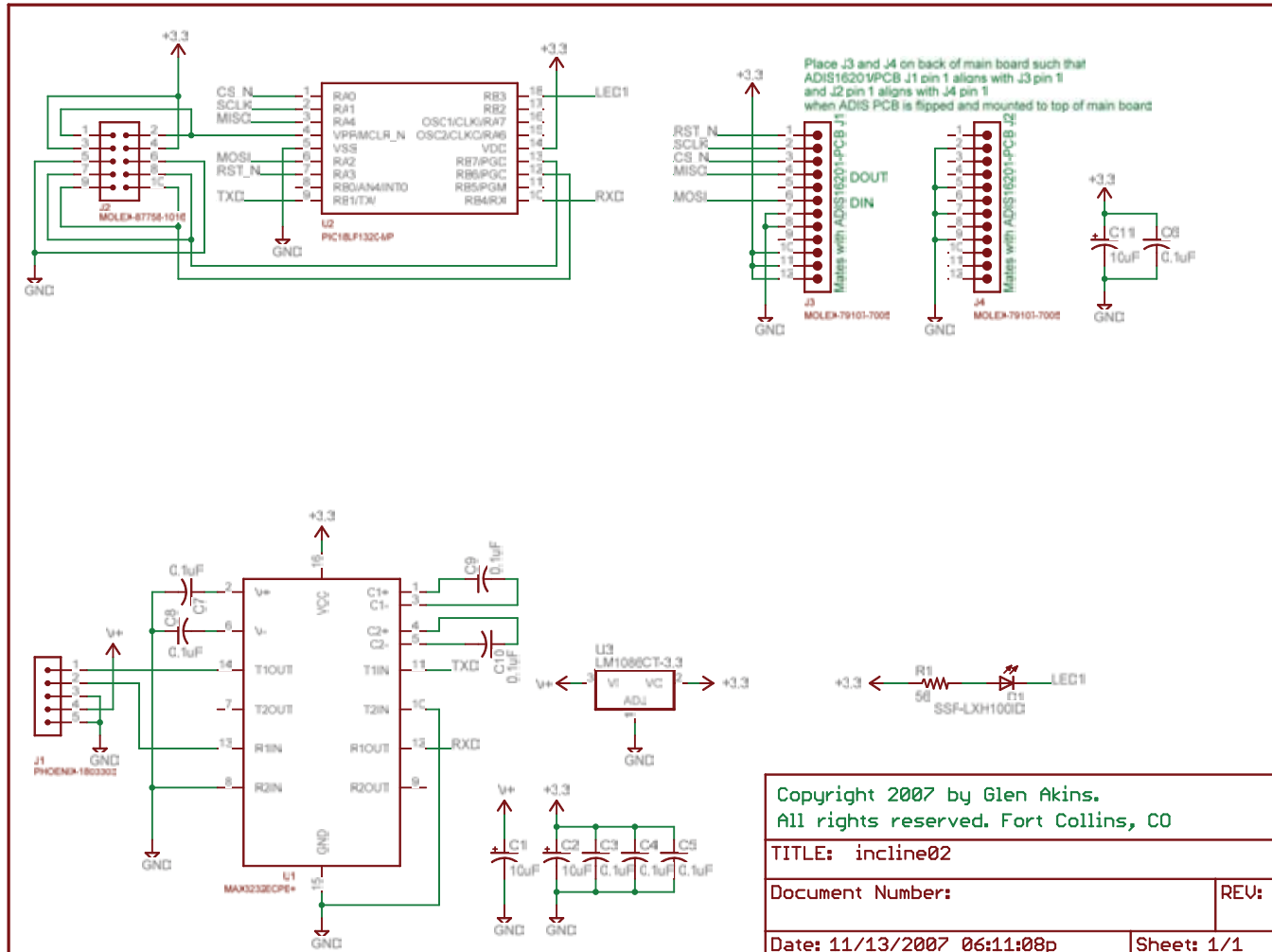
PWB FOOTPRINT

Describes mechanical aspects
of device such as hole diameters
and solder pad sizes.



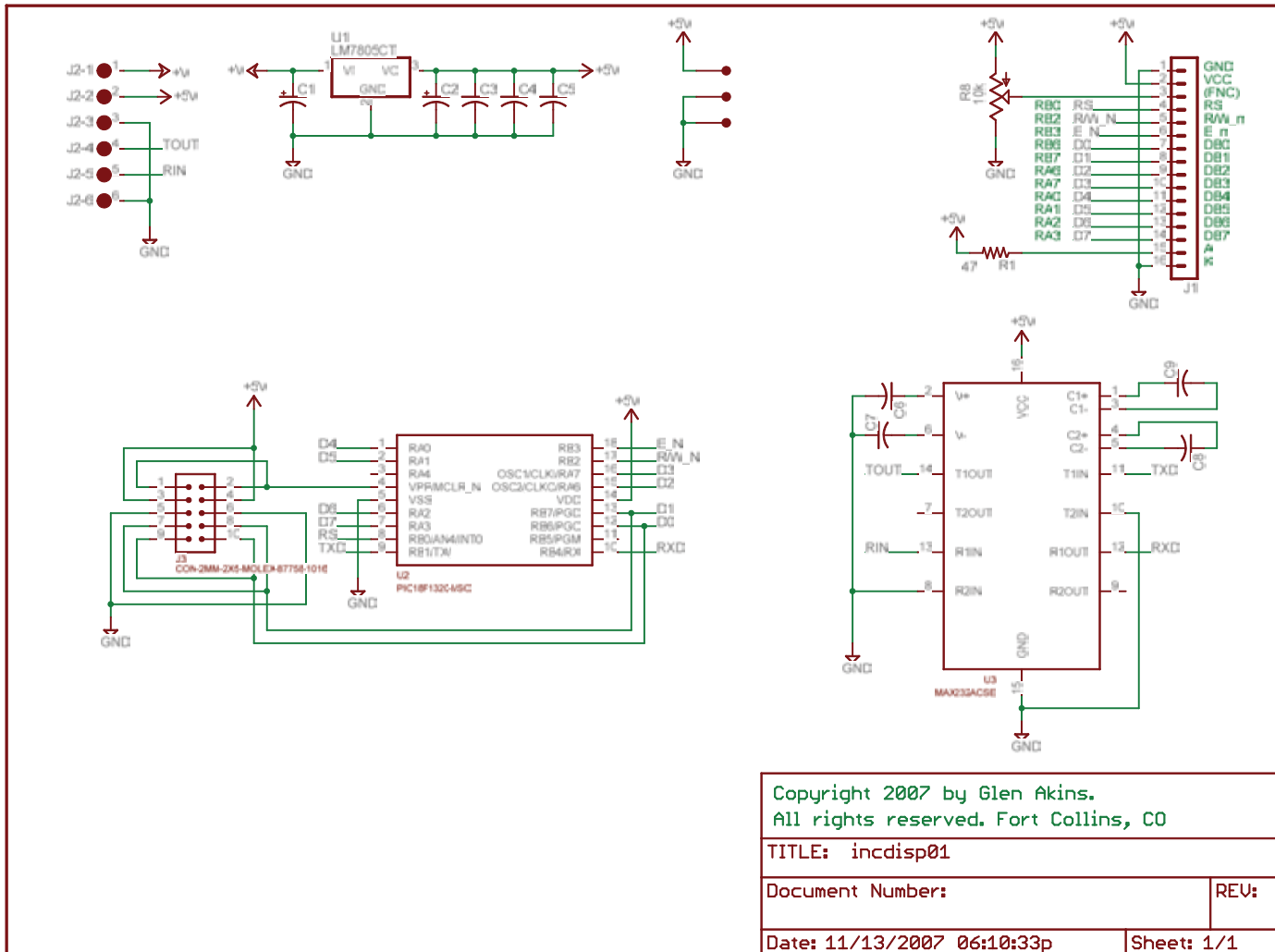
SCHEMATICS

Dual-Axis Inclinometer



SCHEMATICS

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DISPLAY UNIT SCHEMATIC

BOARD LAYOUT

Dual-Axis Inclinometer



DESIGN BOARD

Use schematic and design software to place components and traces.



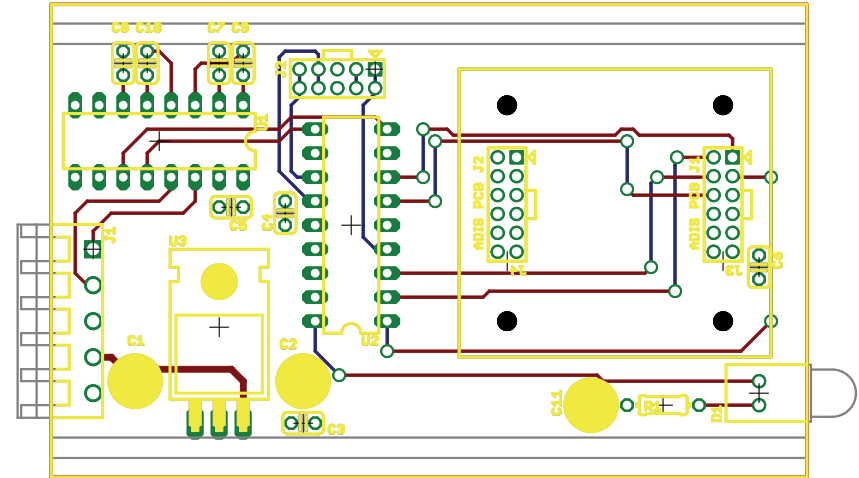
GENERATE GERBERS

Use design software to generate gerbers files describing board for manufacturing.

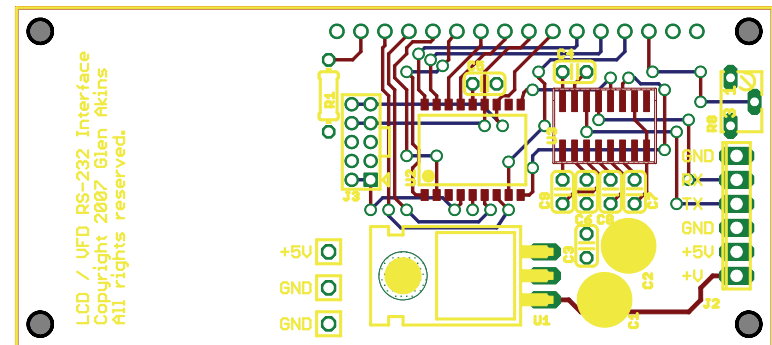


UPLOAD GERBERS

Upload gerbers and credit card info to board vendor. Manufacturing time depends on how much you are willing to pay.



SENSOR BOARD



DISPLAY BOARD

MECHANICAL DESIGN

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PICK A CASE

Hammond Manufacturing makes nice aluminum cases.



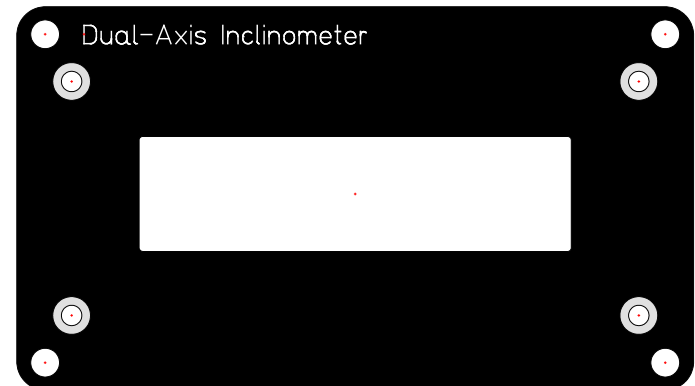
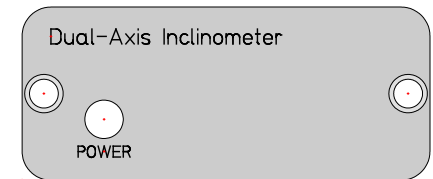
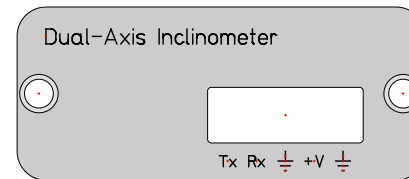
SKETCH COMPONENTS

Determine alignments of all components, panels, case, and circuit board.



DRAW IN CAD SOFTWARE

frontpanelexpress.com
Integrated CAD software and ordering system. Manufacturing time depends on how much you are willing to pay.



SOFTWARE

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PIC18F1320 HAS A FREE C COMPILER AVAILABLE!

Student edition with very few restrictions.



MPLAB IDE

Integrated development environment for all PIC microcontrollers.



ICD2 In-Circuit Debugger / In-Circuit Programmer

Available for \$199 from Microchip.

Lots of clones available for less than \$50.

RESOURCES

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[HTTP://CADSOFTUSA.COM/](http://CADSOFTUSA.COM/)

Freeware schematic capture and PWB design software.
Limited to 3" by 4" board area.



[HTTP://BATCHPCB.COM/](http://BATCHPCB.COM/)

Very slow, but inexpensive PWB manufacturer catering to the hobbyist.
Based in Boulder, but boards manufactured in China. \$10 + \$2.50/sqin



[HTTP://MICROCHIP.COM/](http://MICROCHIP.COM/)

Manufacturers of the PIC line of microcontrollers.
Free IDE and C compiler for PIC microcontrollers.



[HTTP://FRONTPANELEXPRESS.COM/](http://FRONTPANELEXPRESS.COM/)

Free software for designing front panels.
Designs are tied to their manufacturing service. \$10-\$20 for small panels.



[HTTP://KC0VXL.COM](http://KC0VXL.COM)

Links to this presentation, schematics, and photographs.