3/29/2020
V1I1

Variant: [No Variations]

RELEASED 07-APR-2015

DESIGN CONSIDERATIONS

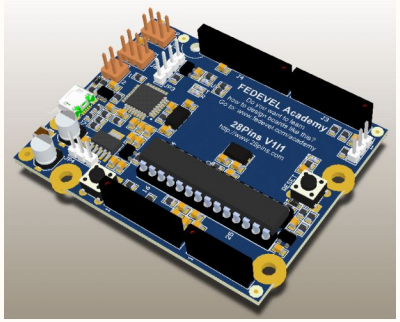
DESIGN NOTE:
Example text for informational design notes.

DESIGN NOTE:
Example text for cautionary design notes.

DESIGN NOTE:
Example text for debug notes.

DESIGN NOTE:
Example text for critical design notes.

LAYOUT NOTE:
Example text for critical layout guidelines.



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Title:	28Pins	Variant:	[No Variations]
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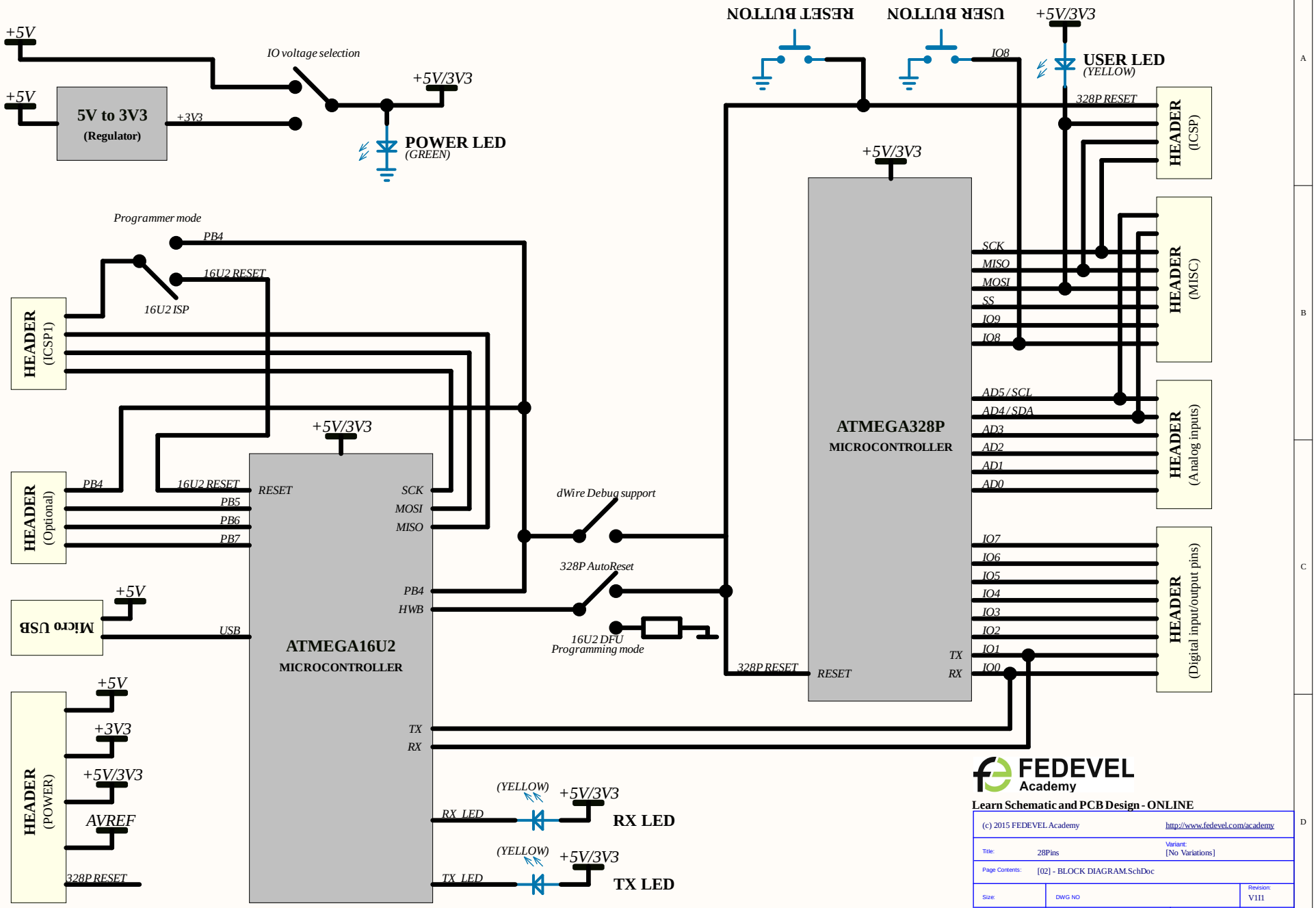
28Pins



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Title:	28Pins	Variant: [No Variations]
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28PINS - SCHEMATIC

http://www.28pins.com

Micro USB

16U2

JP2

ICSP1

JP3

JP1

POWER

POWER PADS

3V3 LDO

Power Selection

ICSP

DIP SOCKET

328P

IOH

MOUNTING HOLES

POWER LED

USER LED

AD

IOL

FIDUCIALS

RESET (16U2)

RESET (328P)

USER BUTTON

DESIGN NOTE:
This board supports 5V or 3V3 voltage level on the IO pins:
1) 5V IO - Fit everything as defined in this schematic. NF means, do not fit this component.

2) 3.3V IO - Remove R27, Fit R28, *Replace Y1 (change from 16MHz to 10MHz), *Replace Y2 (change from 16MHz to 8MHz).

3) Both 5V and 3V3, selected through JP4 - Remove R27, Remove R28, Fit JP4, *Replace Y1 (change from 16MHz to 10MHz), *Replace Y2 (change from 16MHz to 8MHz).

*Note: The 16MHz crystals are not recommended for 3.3V operation. We need to adjust their values, thats why the change.

IMPORTANT: Once you change the crystal value, you may need to re-compile your source code.

DESIGN NOTE:

About JP3:
1) DebugWire support - Short 1&2. This was added to support possible debugWire debugging (programming?) of 328P through 16U2. In this case, the 16U2 needs to have a correct firmware and has to behave as a debugWire tool.

2) ISP programmer mode - Short 2&3. In this case, take a cable and connect J5 & J6 together. Upload AVRISP MKII firmware into 16U2 and you can program 328P. Example of AVRISP MKII firmware can be found at LUFA projects: http://www.fourwalledcubicle.com/LUFA.php (Tip: remap LEDs of the default AVRISP MKII LUFA projectto the RX and TX LEDs on the 28Pin board)

3) ISP header - Short 3 & 4. In this mode, the ICSP1 header is used as a standard ISP header to program 16U2 through ISP interaface by an ISP programmer.

DESIGN NOTE:

About JP1:
1) Autoreset Enabled - Short 1&2. In this case, 16U2 is used to reset 328P when firmware inside 328P is updated from Arduino IDE.

2) 16U2 DFU mode Enabled - Short 2&3. 16U2 HWB pin is sampled by 16U2 during RESET. If pulled low, then after Reset the 16U2 will go into DFU mode (its the mode when you can flash 16U2 firmware through USB and Atmel Flip software: http://www.atmel.com/tools/flip.aspx).

DESIGN NOTE:
This board can be powered from micro USB connector (J7) or a single +3.3V power rail (through J1 pin 4). If +3.3V is used, fit R26 and R28. In this case, JP4 & R27 must NOT be fitted, otherwise the board may be damaged.

DESIGN NOTE:
Pin 8 (VIN) is not supported

DESIGN NOTE:
This LED is inverted:
- SCK High = LED OFF
- SCK Low = LED ON

LAYOUT NOTE:
1) Route all the POWER tracks with minimum track width 0.4mm.
2) Route all the other tracks by 0.4mm and change them by the end of the design to 0.2mm. To change all of them at once, use this filter "(not InNet('+*') and not InNet('GND')) and IsTrack and (OnLayer('L1') or OnLayer('L2'))" and then set 0.2mm width in PCB Inspector panel.

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Designator
[01] - COVER PAGE.SchDoc

Designator
[02] - BLOCK DIAGRAM.SchDoc

Designator
[03] - 28PINS SCHEMATIC.SchDoc

Designator
[04] - REVISION HISTORY.SchDoc

NOTES

Mark Not Fitted Components as
NF

DRAFT - Very early stage of schematic, ignore details.

PRELIMINARY - Close to final schematic.

CHECKED - There should not be any mistakes. Tell the engineer if you find one.

RELEASED - A board with this schematic has been sent to production.

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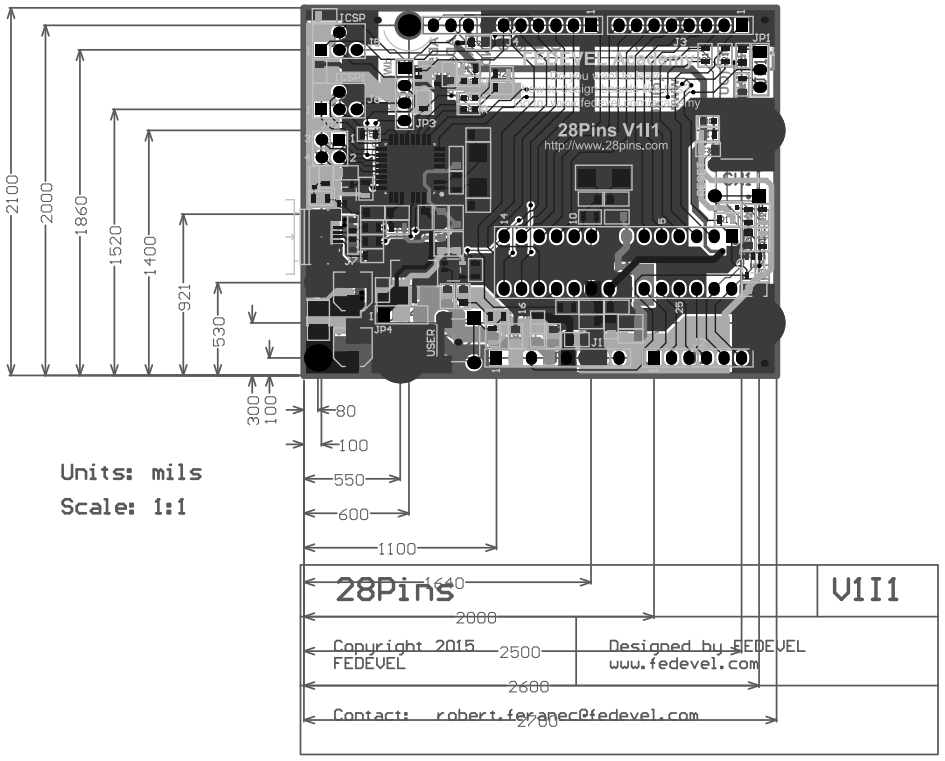
Files
*.GTO - Top Overlay
*.GTP - Top Paste
*.GTS - Top Solder
*.GTL - L1 (Positive)
*.GBL - L2 (Positive)
*.GBS - Bottom Solder
*.GBO - Bottom Overlay
*.GM2 - Mechanical Drawing
*.GM3 - Manufacturing Notes
*.GM4 - Licence
*.GM28 - Board Outline

Mechanical Drawing of 28Pins V1I1

[Assembly TOP of 28Pins V1I1
[No Variations]



Units: mils

Scale: 1:1

Board info
Minimum Track: 200um
Minimum Gap: 200um
Minimum Through Hole VIA: 0.6mm (pad) / 0.3mm (drill). Drilling: L1-L2

1. FINISHED PANEL THICKNESS IS NOT CRITICAL: TO BE APPROXIMATELY 1.6mm

2. BOARD FINISH: IMMERSION Au/ELECTROLESS Ni; 0.05-0.12 um GOLD; 3-6um NICKEL

3. SOLDER RESIST: APPLY TO BOTH SIDES COLOUR - BLUE

4. COMPONENT IDENT: COLOUR TO BE WHITE

5. PANELIZE THE BOARD (4PCS PER PANEL). PLACE FIDUCIALS ON THE PANEL STRIPS AS FOLLOWS:
   - FIDUCIAL DIAMTER 1-1.5MM, SOLDER MASK OPENING AT LEAST 1MM GREATER THAN FIDUCIAL
   - MINIMUM 4MM DISTANCE FROM THE PANEL EDGE
   - 3 FIDUCIALS SHOULD LIE ON TWO LINES THAT INTERSECT AT A RIGHT ANGLE
   - PLACE ONE FIDUCIAL INTO EACH PANEL CORNER (FOUR ON THE TOP LAYER)

Based on Arduino: http://www.arduino.cc/

Board Stack Report