29-08-2018
V1I1

Variant: [No Variations]

RELEASED 15-SEP-2018

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DESIGN CONSIDERATIONS

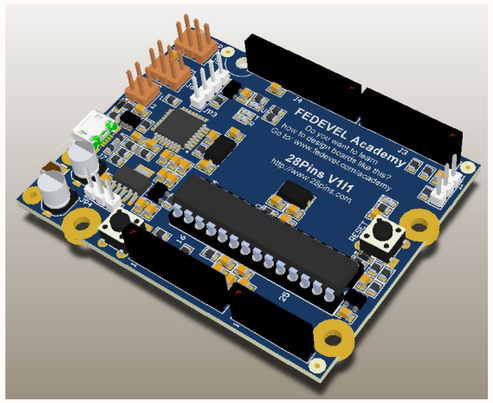
DESIGN NOTE:
Example text for informational design notes.

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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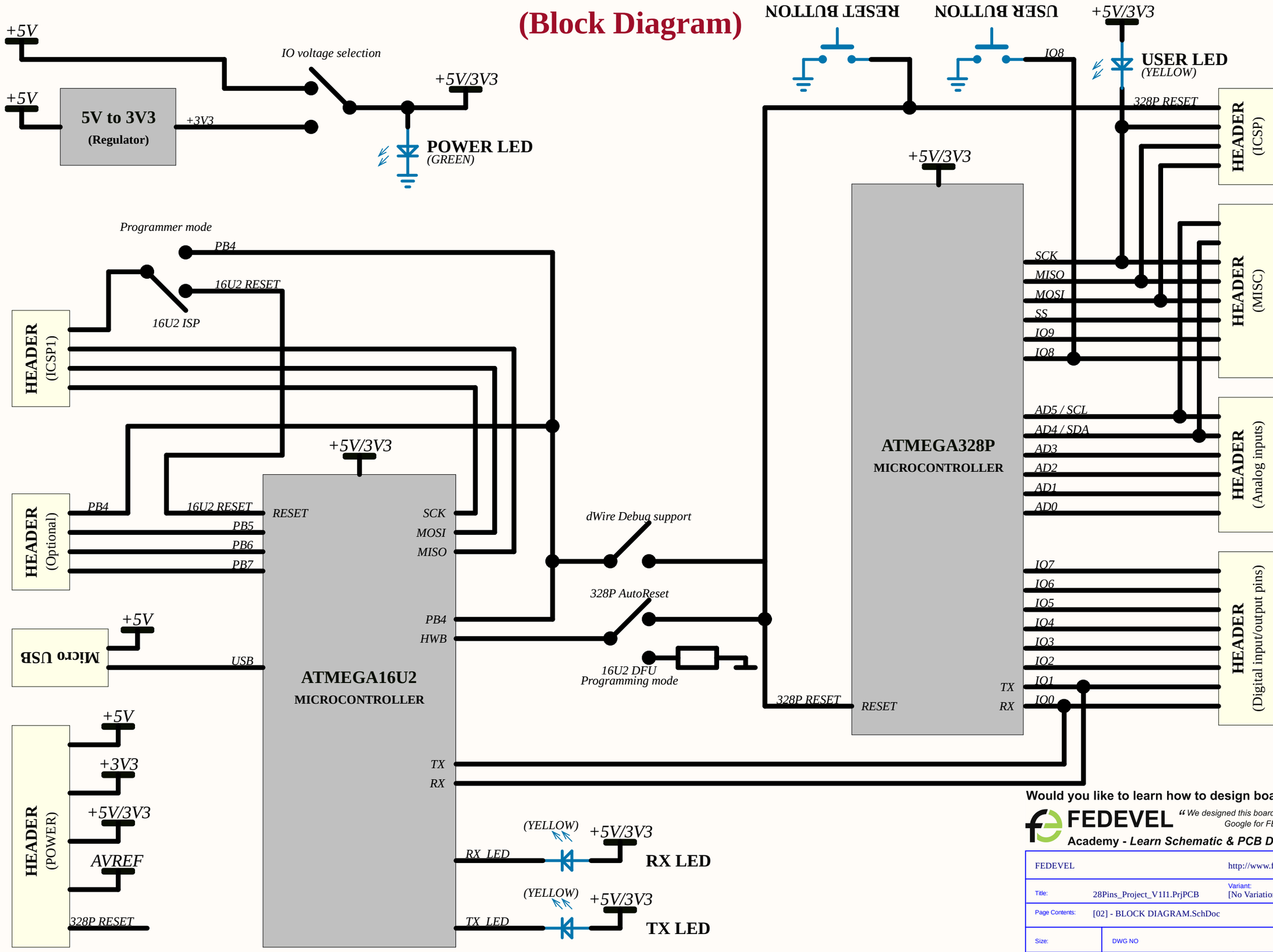
(Block Diagram)



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28PINS - SCHEMATIC

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, thatsh 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 project to 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

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 (it's the mode when you can flash 16U2 firmware through USB and Atmel Flip software: http://www.atmel.com/tools/flip.aspx).

micro USB

J7 10118193-0001LF
L1 2u2 / 2A
C1 100u / 10V
C2 100u / 10V
Z1 CG0603MLC-05E
Z2 CG0603MLC-05E
R8 0R
Differential pair
R6 22R
R7 22R
CON_USB_N
CON_USB_P
USB_N
USB_P

16U2

U2 ATMEGA16U2-AU
FB1 MPZ2012S601AT000
C3 10uF / 16V
C4 100n
C5 100n
C6 100n
C7 1uf / 25V
R4 10k
R26 NP 0R
Y2 ABM7-16.000MHZ-D2Y-T
C9 18p
C10 18p
R9 1M
16U2_RESETn
+3V3_16U2_UCAP
16U2_HWB
16U2_TX_LED
16U2_RX_LED
16U2_TXD
16U2_RXD
R10 1k
R11 1k
16U2PROG_328P_RESETn

JP2

JP2 NP HDR 2x2
R1 100k
R2 560R
R3 560R
D3 Orange
D4 Orange
16U2_PB7
16U2_PB6
16U2_PB5
16U2_PB4
16U2_MISO
16U2_MOSI
16U2_SCLK_R
R5 22R

ICSP1

J6 HDR 2x3
C8 100n
16U2_SCLK
16U2_HDR_RESETn

JP3

JP3 HDR 1x4
328P_RESETn
16U2_PB4
16U2_RESETn

JP1

JP1 HDR 1x3
C11 100n
328P_AUTORESETn
16U2PROG_328P_RESETn
R12 1k
LINK1 LINK
LINK2 LINK

3V3 LDO

U3 TL1963A-33DCQR
C12 10uF / 16V
C13 10uF / 16V

Power Selection

R27 0R
R28 NP 0R
JP4 NP HDR 1x3
LINK3 NP LINK

POWER

C14 100n
C15 100n
C16 100n
C34 10uF / 16V
J1 HDR FMALE 1x8 2.54mm
328P_RESETn
DESIGN NOTE: Pin 8 (VIN) is not supported

POWER PADS

J8 4MMx1.5MM
J9 4MMx1.5MM

328P

U1 ATMEGA328P-PU
FB2 MPZ2012S601AT000
FB3 MPZ2012S601AT000
C19 10uF / 16V
C20 100n
C22 10uF / 16V
C23 100n
C24 100n
C25 18p
C27 18p
R14 10k
R16 1M
Y1 ABM7-16.000MHZ-D2Y-T
328P_RESETn
328P_16MHZ_XTAL2
328P_16MHZ_XTAL1
+AREF
C21 10uF / 16V
SCK_R 22R
R13 SCK

IOH

J4 HDR FMALE 1x10 2.54mm
ADS/SCL
AD4/SDA
MISO
MOSI
SS
IO9
IO8

AD

J2 HDE FMALE 1x6 2.54mm
ADS/SCL
AD4/SDA
AD3
AD2
AD1
AD0

IOL

J3 HDR FMALE 1x8 2.54mm
IO7
IO6
IO5
IO4
IO3
IO2
IO1
IO0

ICSP

J5 HDR 2x3
C17 100n
MISO
SCK
328P_RESETn
MOSI

DIP SOCKET

SCKT FOR U1
28-DIP SOCKET
28-DIP Socket

MOUTING HOLES

MH1 MH2 MH3 MH4
Mounting holes 7.4mm pad 3.2mm drill
BOARD MOUNTING HOLES
ONE IN EACH CORNER

FIDUCIALS

FID1 FID2 FID3 FID4
FIDICIALS 4x TOP

POWER LED

D1 Green
R17 560R

USER LED

U4 SN74AHC1G09DBVR AND
D2 Orange
R15 560R
C26 100n
SCK
DESIGN NOTE:
This LED is inverted:
- SCK High = LED OFF
- SCK Low = LED ON

RESET (16U2)

D5 BAT54HT1G
R19 10k
R28 22R
C31 100n
C30 100n
U5 SN74AHC1G09DBVR AND
16U2_BUF_RESETn
16U2_RESETn

RESET (328P)

Reset Button
SW1 1825910-6
D6 BAT54HT1G
R20 10k
R18 10k
R24 22R
C32 100n
C28 100n
U6 SN74AHC1G09DBVR AND
BUTTON_RESETn
328P_AUTORESETn
328P_BUF_RESETn
328P_RESETn

USER BUTTON

User Button
SW2 1825910-6
R21 10k
R25 22R
C33 100n
C29 100n
U7 SN74AHC1G09DBVR AND
USER_BUTTON
USER_BUTTON_BUF
R22 560R
IO8

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 o
the design to 0.2mm. To change all of them at once, use this filter "(no
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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REVISION HISTORY

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Designator
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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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