EmbedUno

Variant: FIXED 5V

08/01/2021
V1I1

RELEASED 08-JAN-2020

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DESIGN CONSIDERATIONS

DESIGN NOTE:
Example text for debug notes.

DESIGN NOTE:
Example text for informational design notes.

DESIGN NOTE:
Example text for critical design notes.

DESIGN NOTE:
Example text for cautionary design notes.

LAYOUT NOTE:
Example text for critical layout guidelines.

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Embedsystem		http://www.fedevel.com/academy
Title: EmbedUno		Variant: FIXED 5V
Page Contents: [01] - COVER PAGE.SchDoc		Checked by
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EmbedUno
(Block Diagram)

+5V
+5V
5V to 3V3
(Regulator)
+3V3
IO voltage selection
+5V/3V3
POWER LED
(GREEN)

RESET BUTTON
USER BUTTON
+5V/3V3
IO8
USER LED
(YELLOW)
328P RESET
HEADER
(ICSP)
+5V/3V3
SCK
MISO
MOSI
SS
IO9
IO8
HEADER
(MISC)
AD5 / SCL
AD4 / SDA
AD3
AD2
AD1
AD0
HEADER
(Analog inputs)
IO7
IO6
IO5
IO4
IO3
IO2
IO1
IO0
HEADER
(Digital input/output pins)
ATMEGA328P
MICROCONTROLLER
TX
RX
328P RESET
RESET

Programmer mode
PB4
16U2 RESET
16U2 ISP
HEADER
(ICSP1)
+5V/3V3
PB4
16U2 RESET
PB5
PB6
PB7
HEADER
(Optional)
RESET
SCK
MOSI
MISO
dWire Debug support
328P AutoReset
PB4
HWB
16U2 DFU
Programming mode
+5V
Micro USB
USB
ATMEGA16U2
MICROCONTROLLER
TX
RX
+5V
+3V3
+5V/3V3
AVREF
328P RESET
HEADER
(POWER)
(YELLOW)
+5V/3V3
RX_LED
RX LED
(YELLOW)
+5V/3V3
TX_LED
TX LED

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Embedsystem			
Title: EmbedUno		Variant: FIXED 5V	
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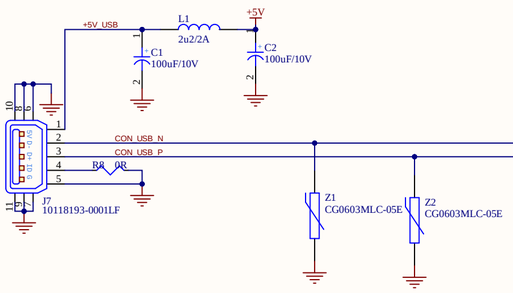
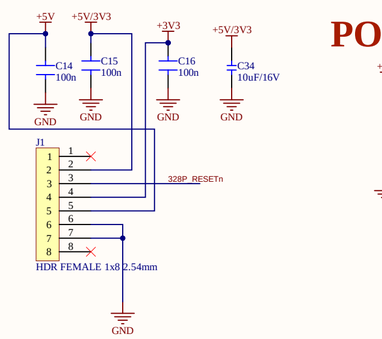
EMBEDUNO - SCHEMATIC

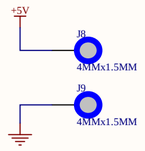
Micro USB



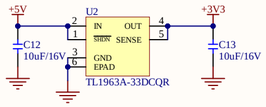
POWER



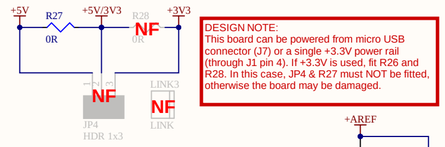
POWER PADS



3V3 LDO

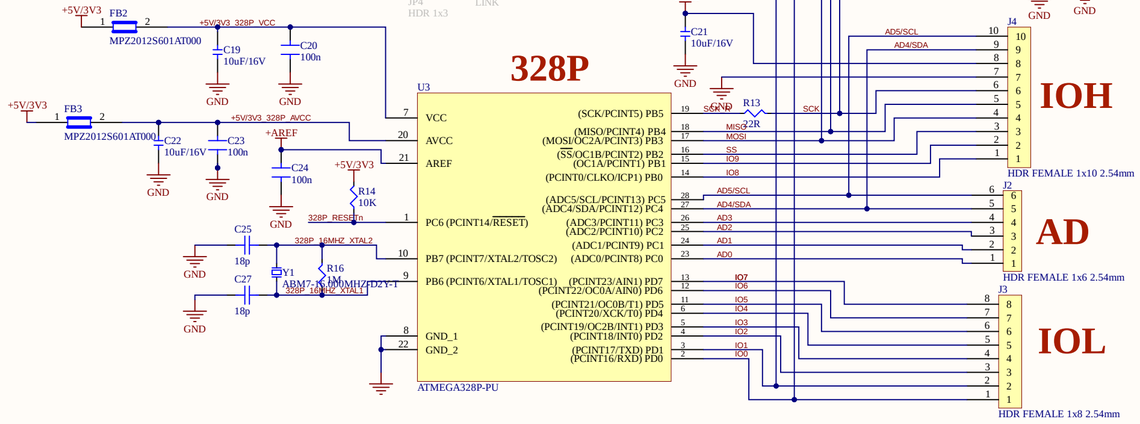


Power Selection

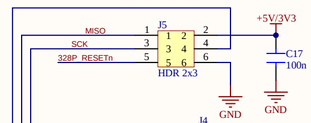


DESIGN NOTE:
This board can be powered from micro USB connector (J7) or a single +3.3V power rail (through J1 pin 4). If +3.3V is used, fit R26 and R28. In this case, JP4 & R27 must NOT be fitted, otherwise the board may be damaged.

328P



ICSP



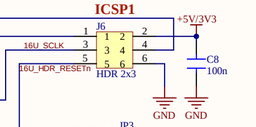
IOH

AD

IOL

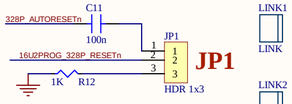
JP2

ICSP1



JP3

JP1



DESIGN NOTE:
This board supports 5V or 3V3 voltage levelo 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 project to the RX and TX LEDs on the 28Pin board)

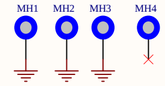
3) ISP header - Short 3 & 4. In this mode, the ICSP1 header is used as a standard ISP header to program 16U2 through ISP interaface by an ISP programmer.

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

DIP SOCKET

MOUNTING HOLES



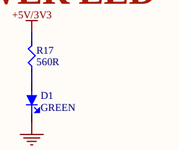
Mounting holes 7.4mm pad 3.2mm drill

BOARD MOUNTING HOLES
ONE IN EACH CORNER

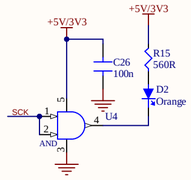
FUDICIALS

FIDICIALS 4x TOP

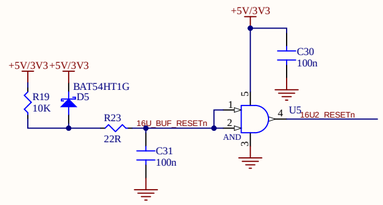
POWER LED



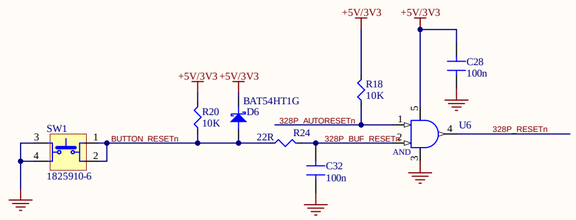
USER LED



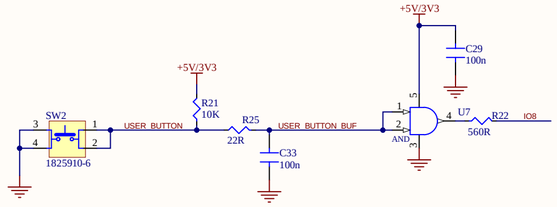
RESET (16U2)



RESET (328P)



USER BUTTON



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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REVISION HISTORY

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Designator
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Designator
[02] - BLOCK DIAGRAM.SchDoc

Designator
[03] - EmbedUno_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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