

EightByEight Blinky Badge

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Revision Notes/Changelog

Revision A:

- Diode mod required to power over USB

Revision B:

- Add diodes to enable power from USB
- Connect ESP reset and boot select pins to ARM for auto-programming
- Connect ESP TX1 pin to ARM for LED control
- Move I2C_SDA to ESP pin 12
- Connect accelerometer interrupt pin to ESP pin 13
- Remove ground planes under ESP8266 antenna area
- Add jumper pad for entering boot mode on ARM processor
- Hook LED_OE or similar to the row driver MUX
- Bring unused ESP pins to pads
- Add TS silkscreen

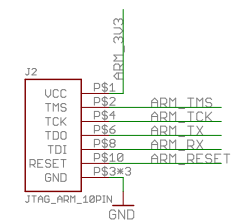
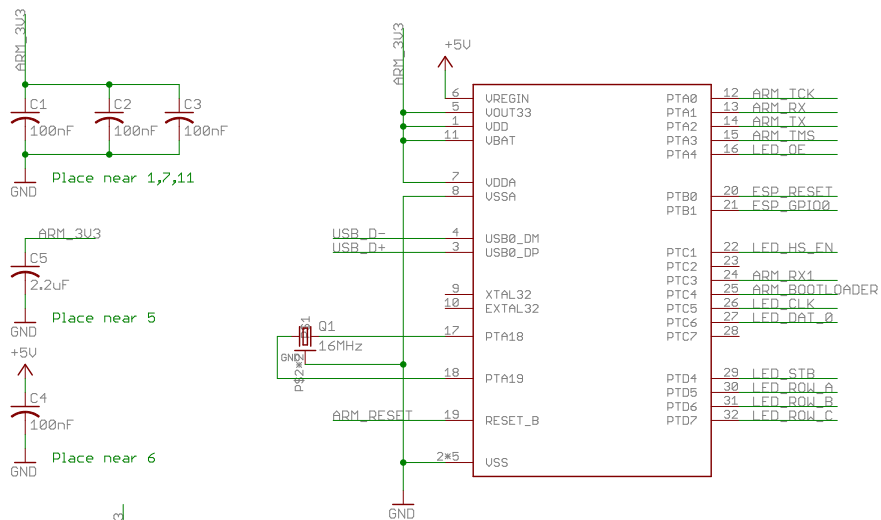
Revision C:

- Switch to ICN2012 high side driver
- Switch to QMA6981 accelerometer
- Change cap values for 3.3V linear regulator

TODO:

- Implement more user friendly expansion pads for the ESP
- Cosmetic: ESP8266 GPIO 18 mislabeled, should be 16
- With LED_HS_EN, should LED_OE still be connected to the mux?
- Characterize the power situation
- Test a flush-mount USB connector
- Add 5v test pad?
- Remove pullup resistor on button?
- Switch 10K to 47K pullups?
- Drop JTAJ connector and replace with test points
- Can the ICN2012 work with 3.3v IO?

Provides LED drive signal, USB/Serial conversion



ARM 10pin JTAG/SWD

Pin assignments for USB/Serial conversion:

ARM_RX and ARM_TX are UART0

ESP_RESET is virtually connected to RTS

ESP_GPI00 is virtually connected to DTR

ESP_0F100 is virtually connected to BTR

Pin assignments for matrix output:

LED_DAT + LED_CLK need to be together on a unique port

LED_ROW_* and LED_STB need to be together on a unique port

LED_ROW_* and LED_STB need to be together on a pin with FTM capability.
LED_OE needs to be on a pin with FTM capability.

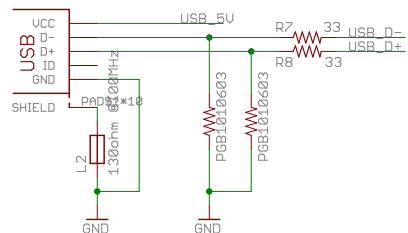
ARM boot select

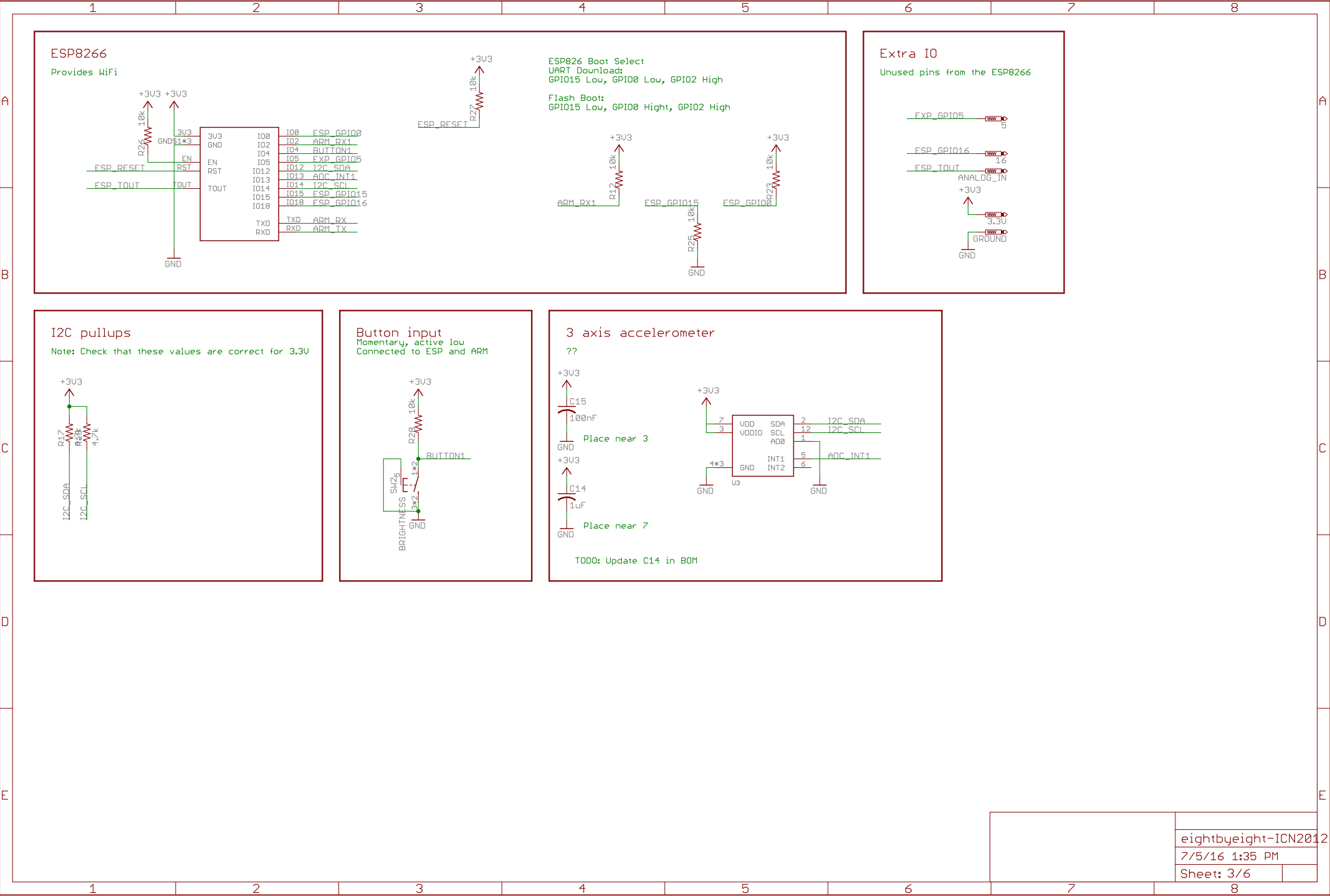
If shorted during boot, the ARM will go directly into DFU mode. Useful if the application firmware becomes unstable. Note that this is a software feature- it is implemented by the bootloader firmware.



USB port

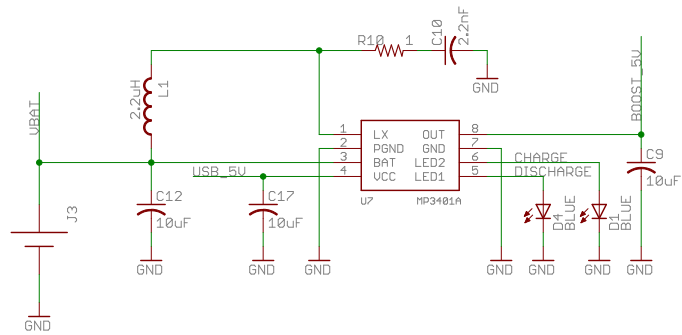
Battery charge, ARM programming using DFU, ESP programming using ACM





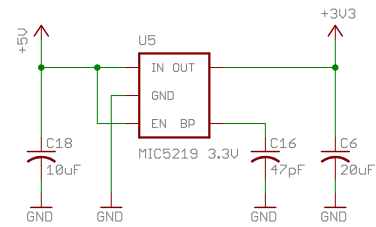
Battery Charger / 5v boost

Integrated charge circuit and 5v boost regulator.



3.3V Regulator

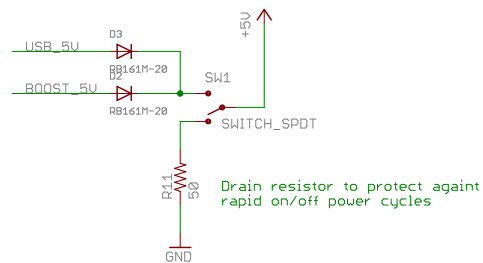
Powers the ESP8266 and other ICs



Note: LED constant current drivers are powered by a regulator built into the ARM part.

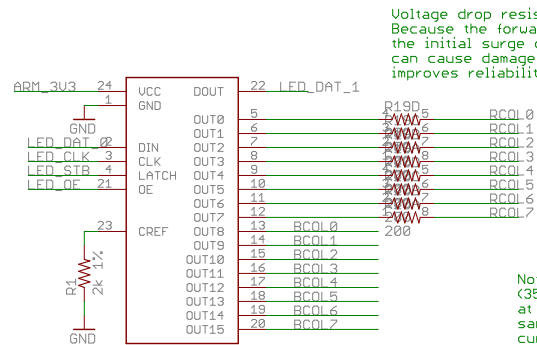
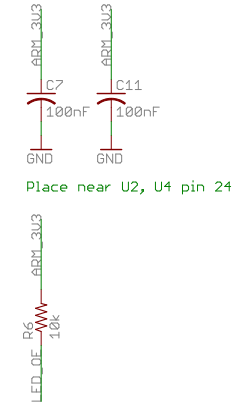
Power switch

Powers device from USB or battery



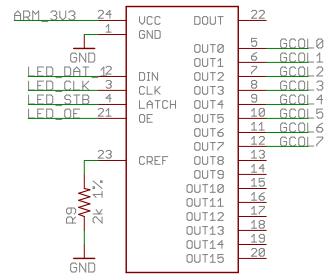
Low side (column) drivers

Constant current shift registers, PWM signal is generated by the processor



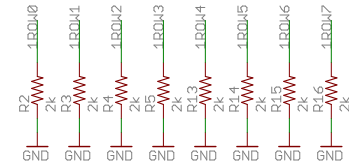
Note: Based on the datasheet for the LED we are using (3528RGB4C-CA), R and B have similar luminous intensity at the same forward current so they can be driven from the same driver. Ideally each color would have an independent current setpoint, however that would require an extra drive IC

Note: Tune CREF resistors for each color



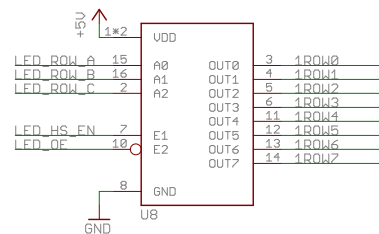
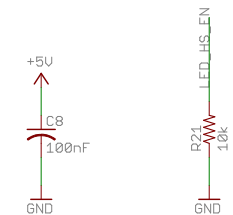
Ghostbusting resistors

Reduces ghosting by draining row capacitance



High side (row) driver

3 to 8 de-multiplexer with integrated P-MOSFETs



Note: LED_HS_EN prevents the first row of LEDs from flashing briefly during poweron.

