

EightByEight Blinky Badge

Copyright 2016 Blinkinlabs, LLC

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

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

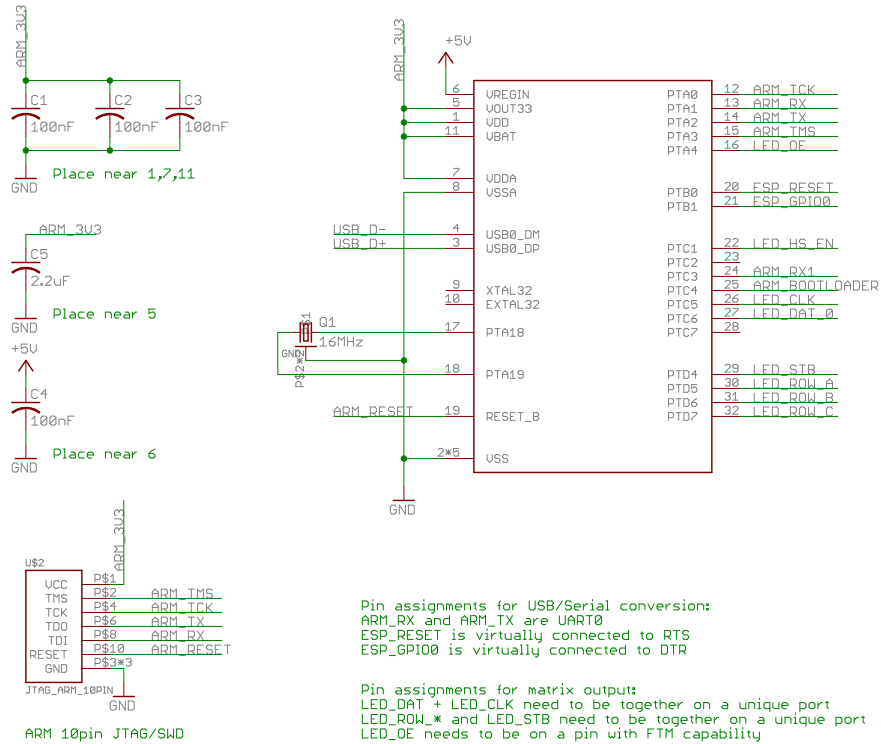
eightbyeight

6/29/16 2:52 PM

Sheet: 1/6

ARM microcontroller

Provides LED drive signal, USB/Serial conversion



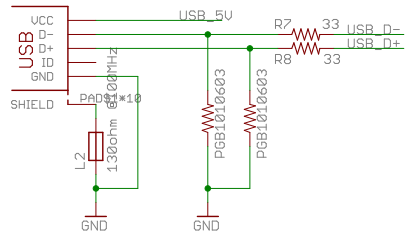
ARM boot select

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.



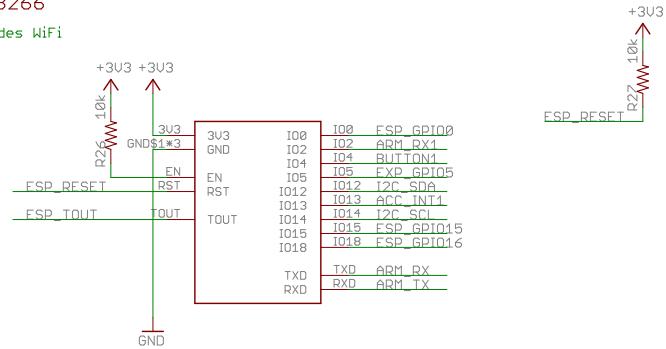
USB port

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



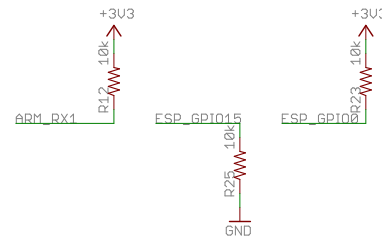
ESP8266

Provides WiFi



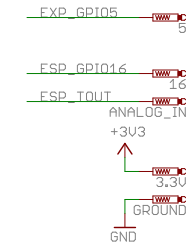
ESP826 Boot Select
UART Download:
GPIO15 Low, GPIO0 Low, GPIO2 High

Flash Boot:
GPIO15 Low, GPIO0 High, GPIO2 High



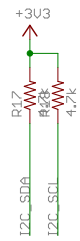
Extra IO

Unused pins from the ESP8266



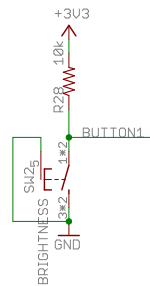
I2C pullups

Note: Check that these values are correct for 3.3V



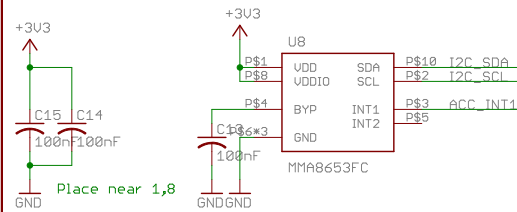
Button input

Momentary, active low
Connected to ESP and ARM



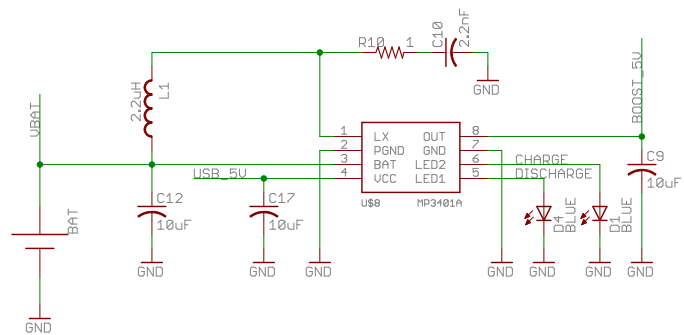
3 axis accelerometer

??



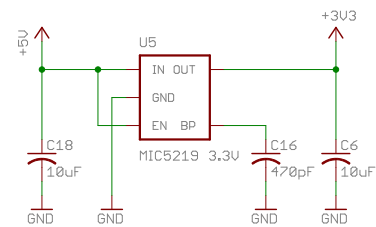
Battery Charger / 5v boost

Integrated charge circuit and 5v boost regulator.



3.3V Regulator

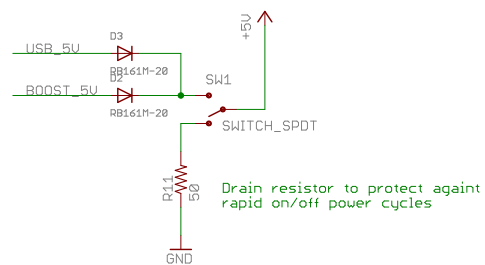
Powers the ESP8266 and other ICs



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

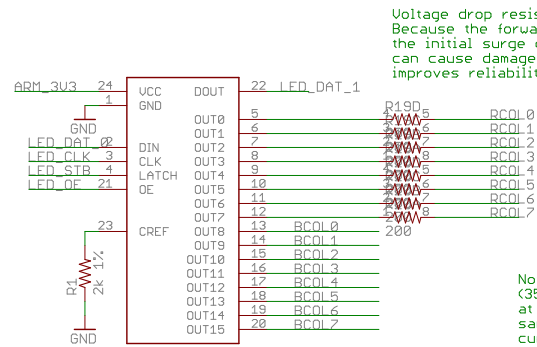
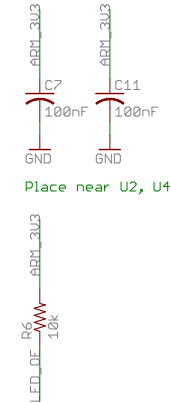
Power switch

Powers device from USB or battery



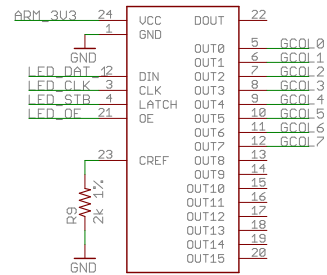
Low side (column) drivers

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



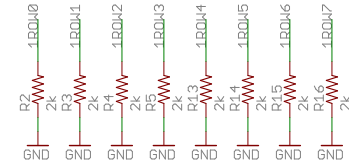
Note: Based on the datasheet for the LED we are using (3528RGB4C-CA), R and B have similar luminous intensity at the same forward current so they can be driven from the same driver. Ideally each color would have an independent current setpoint, however that would require an extra drive IC

Note: Tune CREF resistors for each color



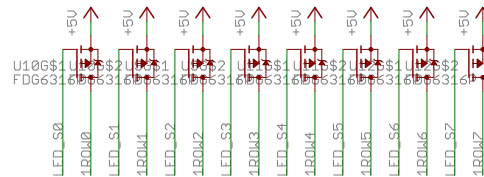
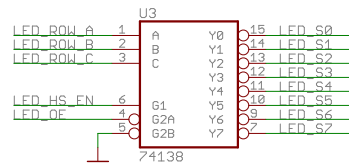
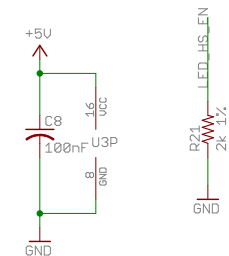
Ghostbusting resistors

Reduces ghosting by draining row capacitance



High side (column) drivers

P channel MOSFETs with gate drive capability



Note: The primary purpose for the MUX is to boost the 10 signals to 5V. A secondary benefit is to reduce the number of I/O lines needed on the ARM processor.
Note: LED_HS_EN prevents the first row of LEDs from flashing briefly during poweron.

eightbyeight

6/29/16 2:52 PM

Sheet: 5/6

