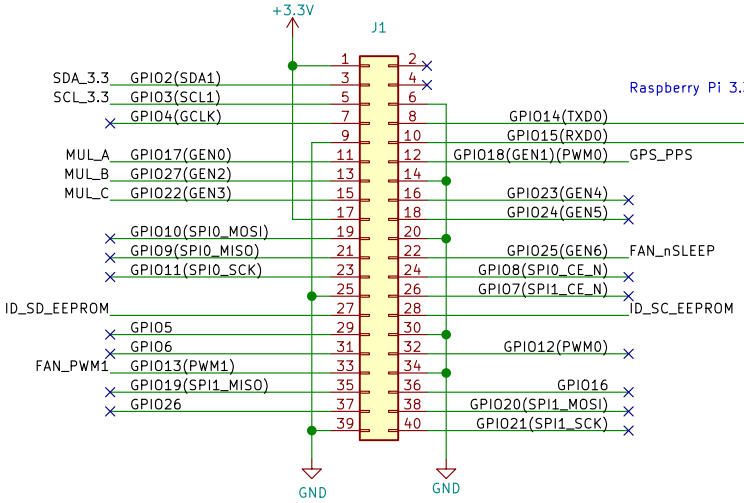
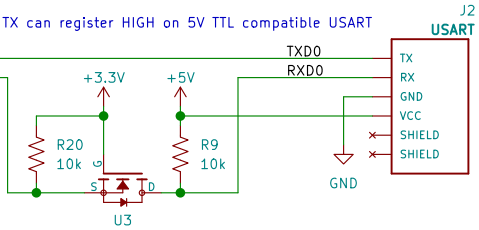
Raspberry Pi Header



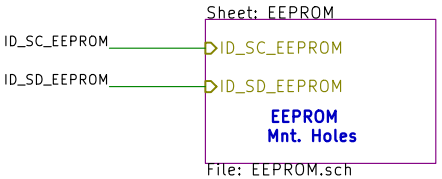
5V USART , 3.3V Pi Compatible

Raspberry Pi 3.3V TX can register HIGH on 5V TTL compatible USART

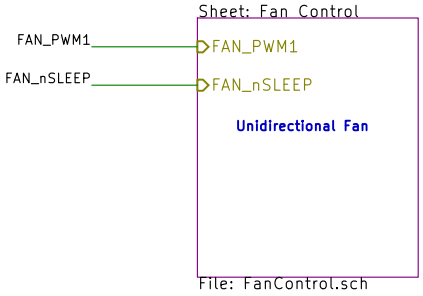


Step the TX line from target device
down for 3.3V RX on Raspbery line
Similiar BSS138 circuit as I2C logic level shifting.

Raspberry Pi HAT Requirements: EEPROM

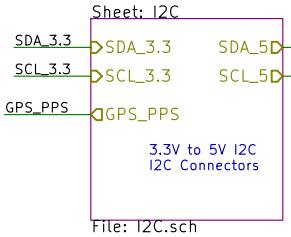


PWM controlled Fan

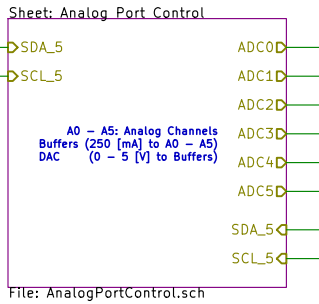


I2C Connectors and I2C Logic Level Conversion

SCL/SDA 5V is on the same I2C bus as 3.3V SCL/SDA

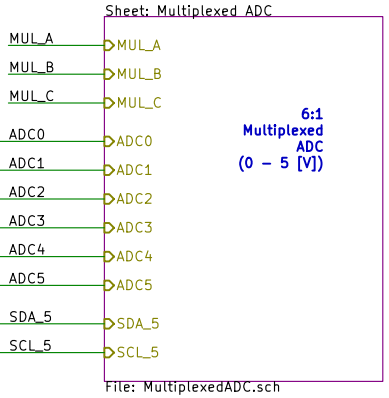


DAC/Buffer power control for Analog Sensors Analog Sensor Ports: A0–A5



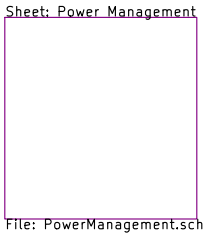
Software Driver:
zephyrus-iaq/Software/HAT/IAQ_DAC43608.py
zephyrus-iaq/Software/HAT/IAQ_AnalogPortController.py

Multiplexed 16-bit ADC



Software Driver:
zephyrus-iaq/Software/HAT/IAQ_Mux.py
zephyrus-iaq/Software/third_party/Adafruit_I2C.py
zephyrus-iaq/Software/third_party/Adafruit_ADS1x15.py

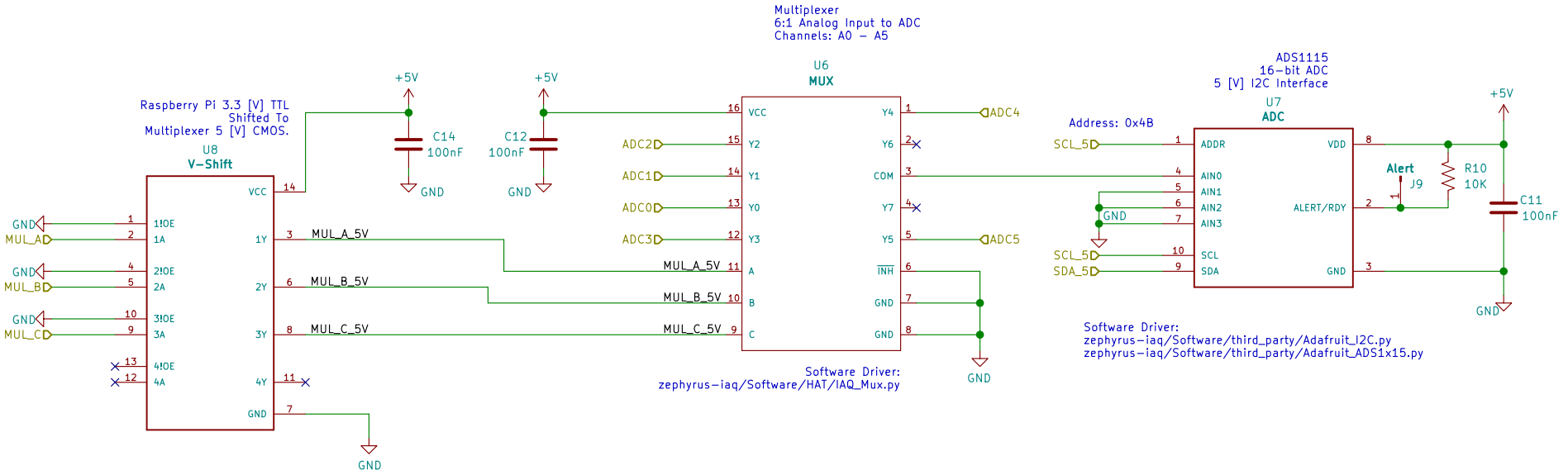
Power Mgmt.



Designed By Aaron Jense
Zephyrus, Indoor Air Quality – Raspberry Pi HAT
Sheet: /
File: Zephyrus-IAQ-HAT.sch

Title: Top Level

Size: USLetter	Date: 2019-11-15	**Rev: A**
KiCad E.D.A. kicad (5.1.4)-1		Id: 1/7



Designed By Aaron Jense

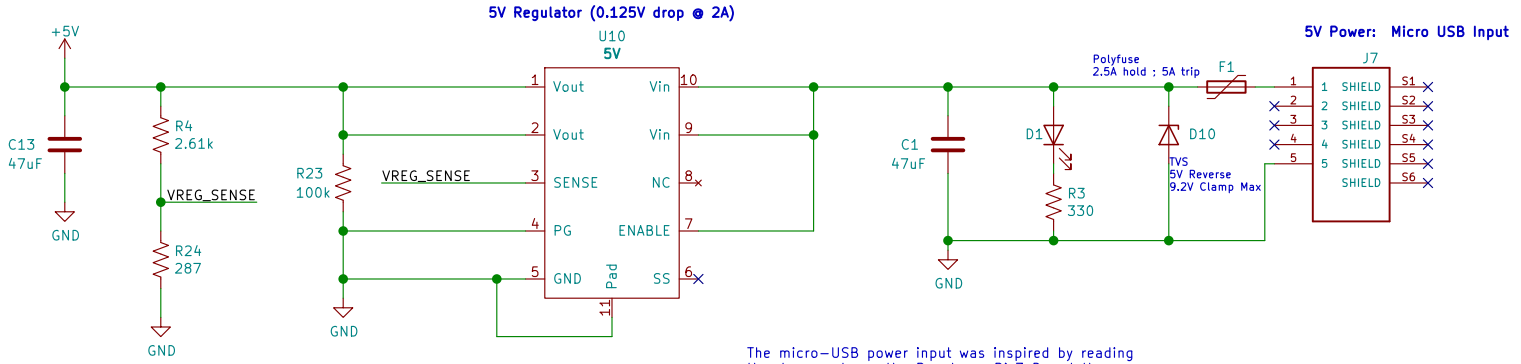
Zephyrus, Indoor Air Quality – Raspberry Pi HAT

Sheet: /Multiplexed ADC/

File: MultiplexedADC.sch

Title: Multiplexed Analog Input

Size: USLetter	Date: 2019-11-15	**Rev: A**
KiCad E.D.A. kicad (5.1.4)-1		Id: 2/7



The micro-USB power input was inspired by reading
the documents on the Raspberry Pi 3 B+ at the
following link (Upper Left Hand Corner of Schematic):
https://www.raspberrypi.org/documentation/hardware/raspberrypi/schematics/rpi_SCH_3bplus_1p0_reduced.pdf

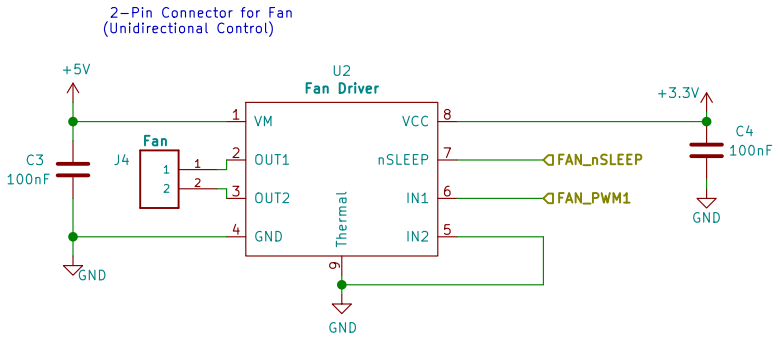
License:
https://www.raspberrypi.org/creative-commons/

No changes except for the voltage regulator
that the micro-USB input feeds into.

Designed By Aaron Jense
Zephyrus, Indoor Air Quality – Raspberry Pi HAT
Sheet: /Power Management/
File: PowerManagement.sch

Title: Power Management

Size: USLetter	Date: 2019-11-15	**Rev: A**
KiCad E.D.A. kicad (5.1.4)-1		Id: 3/7



Designed By Aaron Jense

Zephyrus, Indoor Air Quality – Raspberry Pi HAT

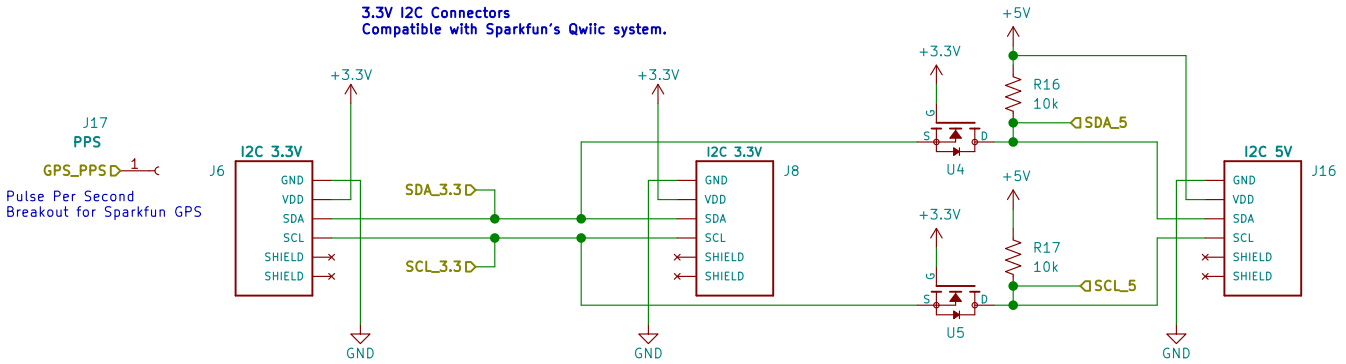
Sheet: /Fan Control/

File: FanControl.sch

Title: Motor Driver for Fan

Size: USLetter	Date: 2019-11-15	**Rev: A**
KiCad E.D.A. kicad (5.1.4)-1		Id: 4/7

3.3V and 5V I2C Connectors



The Bi-Directional logic level shift using the BSS138
was inspired by reading Sparkfun's schematic
https://cdn.sparkfun.com/datasheets/BreakoutBoards/Logic_Level_Bidirectional.pdf

Changes:
There is no Pull-Up on the Source, because of the
interl Raspberry Pi 1.8k Pull-Ups

Designed By Aaron Jense

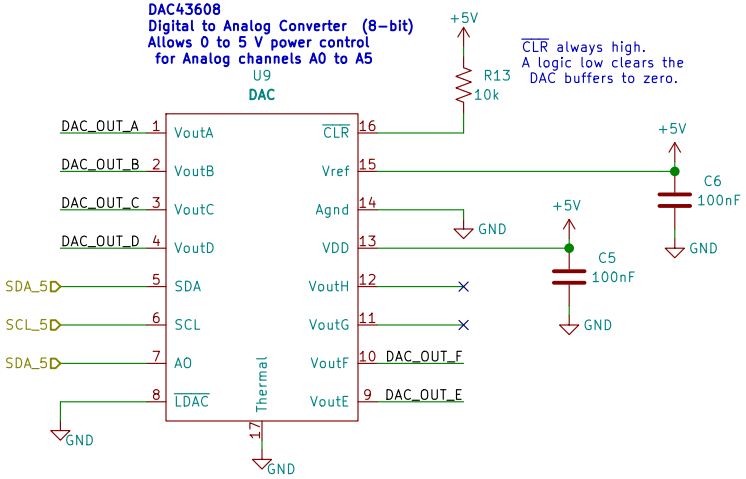
Zephyrus, Indoor Air Quality – Raspberry Pi HAT

Sheet: /I2C/
File: I2C.sch

Title: I2C Connectors and Logic Level Conversion

Size: USLetter	Date: 2019-11-15	**Rev: A**
KiCad E.D.A. kicad (5.1.4)-1		Id: 5/7

DAC43608
Digital to Analog Converter (8-bit)
Allows 0 to 5 V power control
for Analog channels A0 to A5

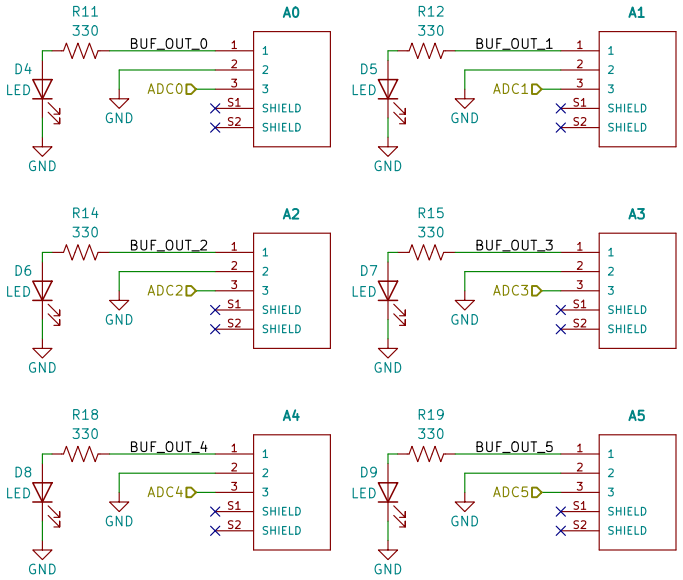


CLR always high.
A logic low clears the
DAC buffers to zero.

Software Driver:
zephyrus-iaq/Software/HAT/IAQ_DAC43608.py

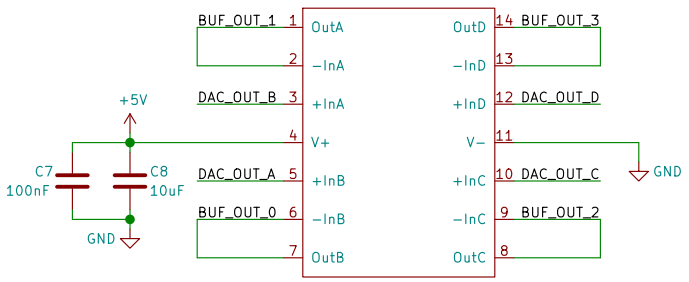
I2C Address: 0x4A
LDAC=0 is asynchronous mode
(immediate update on DAC after write to register)

Analog Connector Ports [A0 – A5] (MQ Gas Sesnors)
0 – 5 [V] from DAC
Up to 250 mA from Buffers

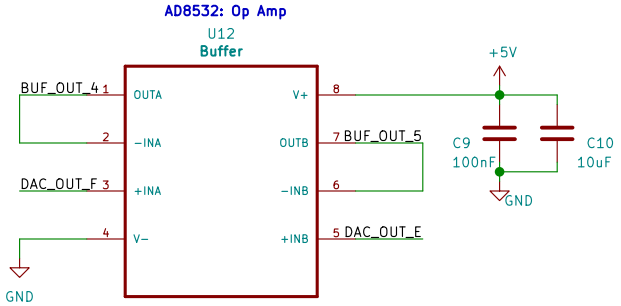


Buffers
Up to 250 mA per channel
Single Supply

AD8534: Op Amp



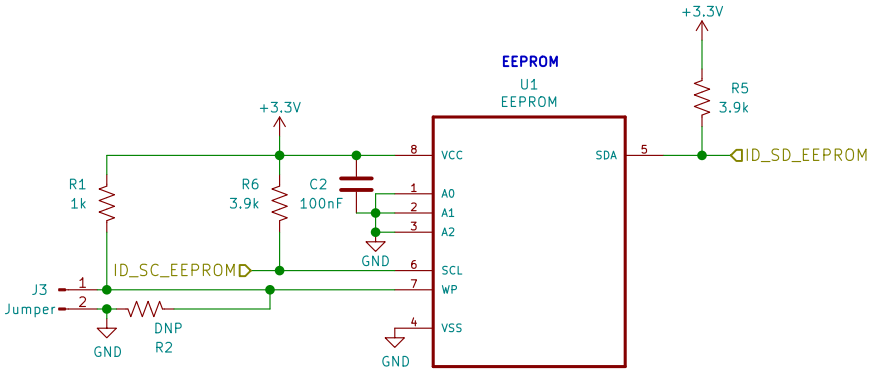
AD8532: Op Amp



Designed By Aaron Jense
Zephyrus, Indoor Air Quality – Raspberry Pi HAT
Sheet: /Analog Port Control/
File: AnalogPortControl.sch

Title: Analog Port Control [A0–A5]

Size: USLetter	Date: 2019-11-15	**Rev: A**
KiCad E.D.A. kicad (5.1.4)-1		Id: 6/7



At boot time this I2C interface will be interrogated to look for an EEPROM that identifes the attached board and allows automagic setup of the GPIOs (and optionally, Linux drivers).

Designed By Aaron Jense

Zephyrus, Indoor Air Quality – Raspberry Pi HAT

Sheet: /EEPROM/

File: EEPROM.sch

Title: Raspberry Pi HAT Specifications

Size: USLetter	Date: 2019-11-15	**Rev: A**
KiCad E.D.A. kicad (5.1.4)-1		Id: 7/7