Sheet: MCU

PWR_CH0_OVLD
PWR_CH1_OVLD
PWR_CH2_OVLD
PWR_CH3_OVLD
PWR_CH4_OVLD
PWR_CH5_OVLD
PWR_CH6_OVLD
PWR_CH7_OVLD

SERCOM0_SCLK
SERCOM0_DOUT
SERCOM0_DIN
ADS1247_CS
ADS1247_DRDY
ADS1247_START

CANH1
CANL1

HE_CH0
HE_CH1

PWR_CH0_EN
PWR_CH1_EN
PWR_CH2_EN
PWR_CH3_EN
PWR_CH4_EN
PWR_CH5_EN
PWR_CH6_EN
PWR_CH7_EN

PWR_CH0_CURR_SENSE
PWR_CH1_CURR_SENSE
PWR_CH2_CURR_SENSE
PWR_CH3_CURR_SENSE
PWR_CH4_CURR_SENSE
PWR_CH5_CURR_SENSE
PWR_CH6_CURR_SENSE
PWR_CH7_CURR_SENSE

SERCOM4_SCLK
SERCOM4_DIN
SERCOM4_DOUT
MAX31865_CS
MAX31865_DRDY

File: MCU.sch

PWR_FLAG
VCC
J1
Conn_02x04_Top_Bottom
CANH0
CANH1
RESERVED0
CANL0
CANL1
RESERVED1
GND

Daisy chain together multiple boards
using these connectors

VCC
J2
Conn_02x04_Top_Bottom
CANH0
CANH1
RESERVED0
CANL0
CANL1
RESERVED1
GND

+3V3
27k
R1
1k
R2
RESET
SW_Push
SW1
C1
6.8nF
GND

Sheet: Sensors

SERCOM0_SCLK
SERCOM0_DOUT
SERCOM0_DIN
ADS1247_CS
ADS1247_DRDY
ADS1247_START

PWR_PT0
PWR_PT1
PWR_PT2
PWR_PT3
PWR_PT4
PWR_PT5
PWR_HE0
PWR_HE1

HE_CH0
HE_CH1

SERCOM4_SCLK
SERCOM4_DIN
SERCOM4_DOUT
MAX31865_CS
MAX31865_DRDY

VCC_SENSE
VCC2_SENSE

File: Sensors.sch

Sheet: Power

PWR_CH0
PWR_CH0_EN
PWR_CH0_OVLD
PWR_CH0_CURR_SENSE
PWR_CH0_CURR_OVLD
PWR_CH0_CURR_SENS

PWR_CH1
PWR_CH1_EN
PWR_CH1_OVLD
PWR_CH1_CURR_SENSE
PWR_CH1_CURR_OVLD
PWR_CH1_CURR_SENS

PWR_CH2
PWR_CH2_EN
PWR_CH2_OVLD
PWR_CH2_CURR_SENSE
PWR_CH2_CURR_OVLD
PWR_CH2_CURR_SENS

PWR_CH3
PWR_CH3_EN
PWR_CH3_OVLD
PWR_CH3_CURR_SENSE
PWR_CH3_CURR_OVLD
PWR_CH3_CURR_SENS

PWR_CH4
PWR_CH4_EN
PWR_CH4_OVLD
PWR_CH4_CURR_SENSE
PWR_CH4_CURR_OVLD
PWR_CH4_CURR_SENS

PWR_CH5
PWR_CH5_EN
PWR_CH5_OVLD
PWR_CH5_CURR_SENSE
PWR_CH5_CURR_OVLD
PWR_CH5_CURR_SENS

PWR_CH6
PWR_CH6_EN
PWR_CH6_OVLD
PWR_CH6_CURR_SENSE
PWR_CH6_CURR_OVLD
PWR_CH6_CURR_SENS

PWR_CH7
PWR_CH7_EN
PWR_CH7_OVLD
PWR_CH7_CURR_SENSE
PWR_CH7_CURR_OVLD
PWR_CH7_CURR_SENS

VCC_SENSE
VCC2_SENSE

File: Power.sch

Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project

Sheet: /
File: Extention Boards.sch

Title: HELIX Extension Board

Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1		Id: 1/10

Sheet: PWR_CH_VCC

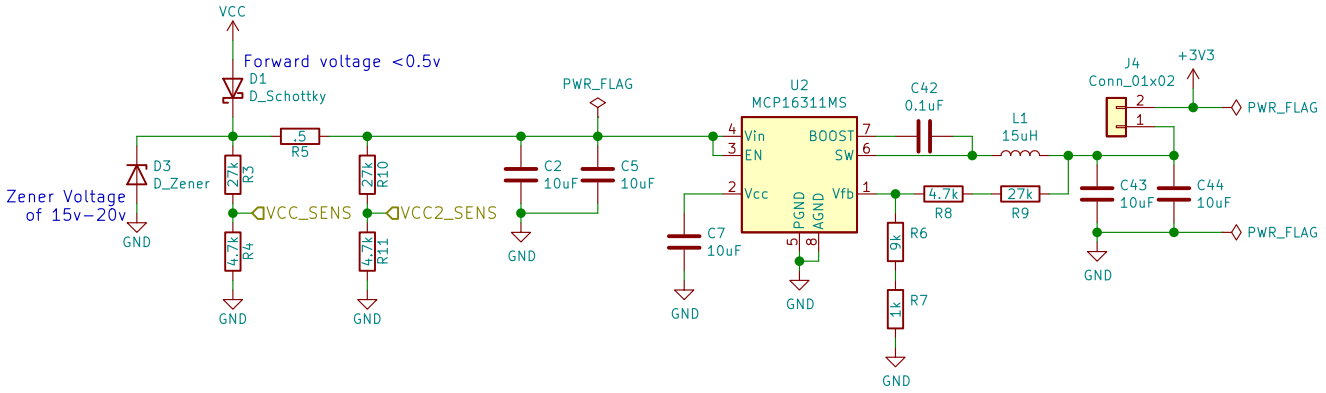
PWR_CH0
PWR_CH0_EN
PWR_CH0_CURR_SENS
PWR_CH0_CURR_OVLD
PWR_CH1
PWR_CH1_EN
PWR_CH1_CURR_SENS
PWR_CH1_CURR_OVLD
PWR_CH2
PWR_CH2_EN
PWR_CH2_CURR_SENS
PWR_CH2_CURR_OVLD
PWR_CH3
PWR_CH3_EN
PWR_CH3_CURR_SENS
PWR_CH3_CURR_OVLD
PWR_CH4
PWR_CH4_EN
PWR_CH4_CURR_SENS
PWR_CH4_CURR_OVLD
PWR_CH5
PWR_CH5_EN
PWR_CH5_CURR_SENS
PWR_CH5_CURR_OVLD

File: PWR_CH_VCC.sch

Sheet: PWR_CH_5v

PWR_CH0
PWR_CH0_EN
PWR_CH0_CURR_SENS
PWR_CH0_CURR_OVLD
PWR_CH1
PWR_CH1_EN
PWR_CH1_CURR_SENS
PWR_CH1_CURR_OVLD

File: PWR_CH_5v.sch

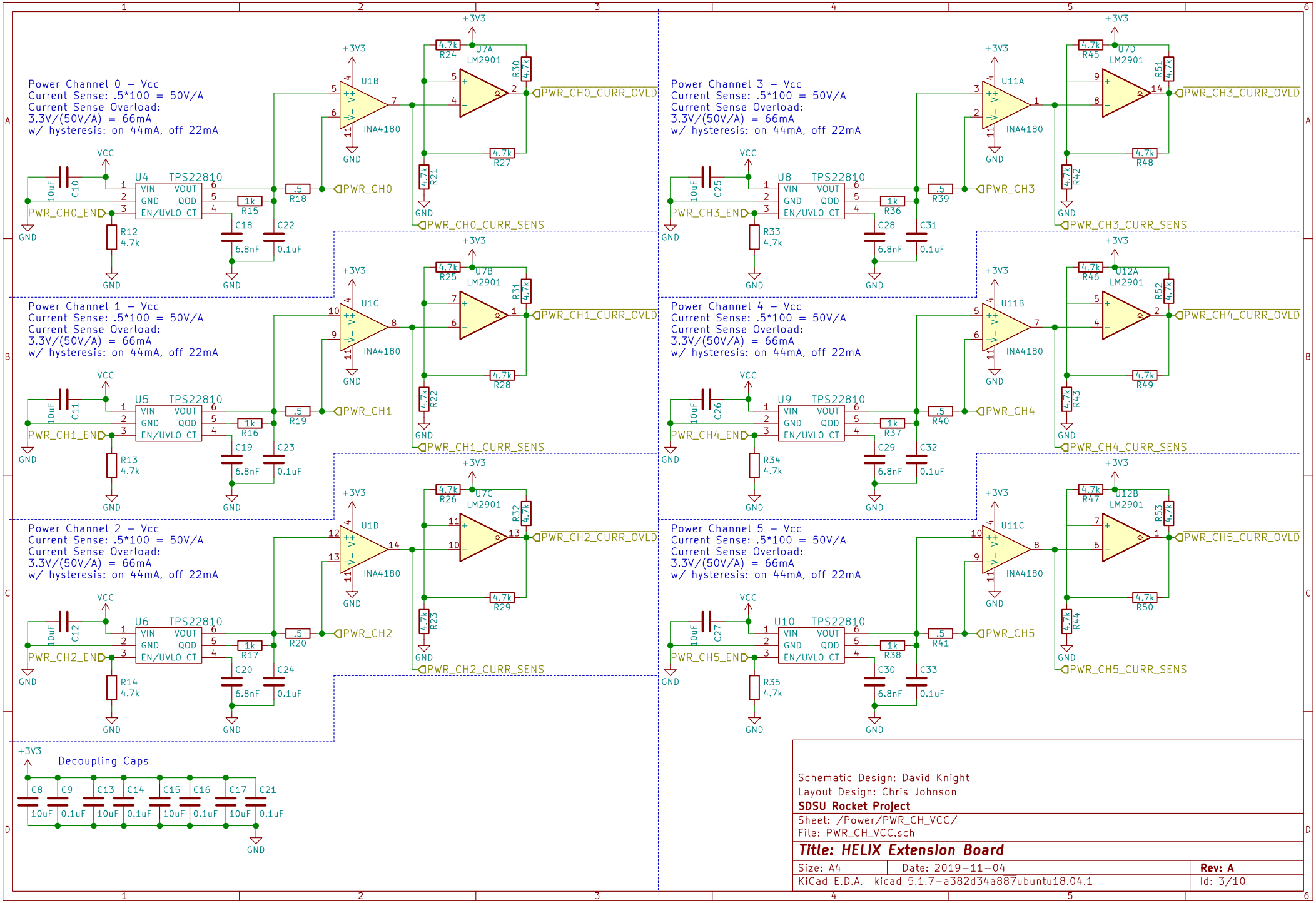


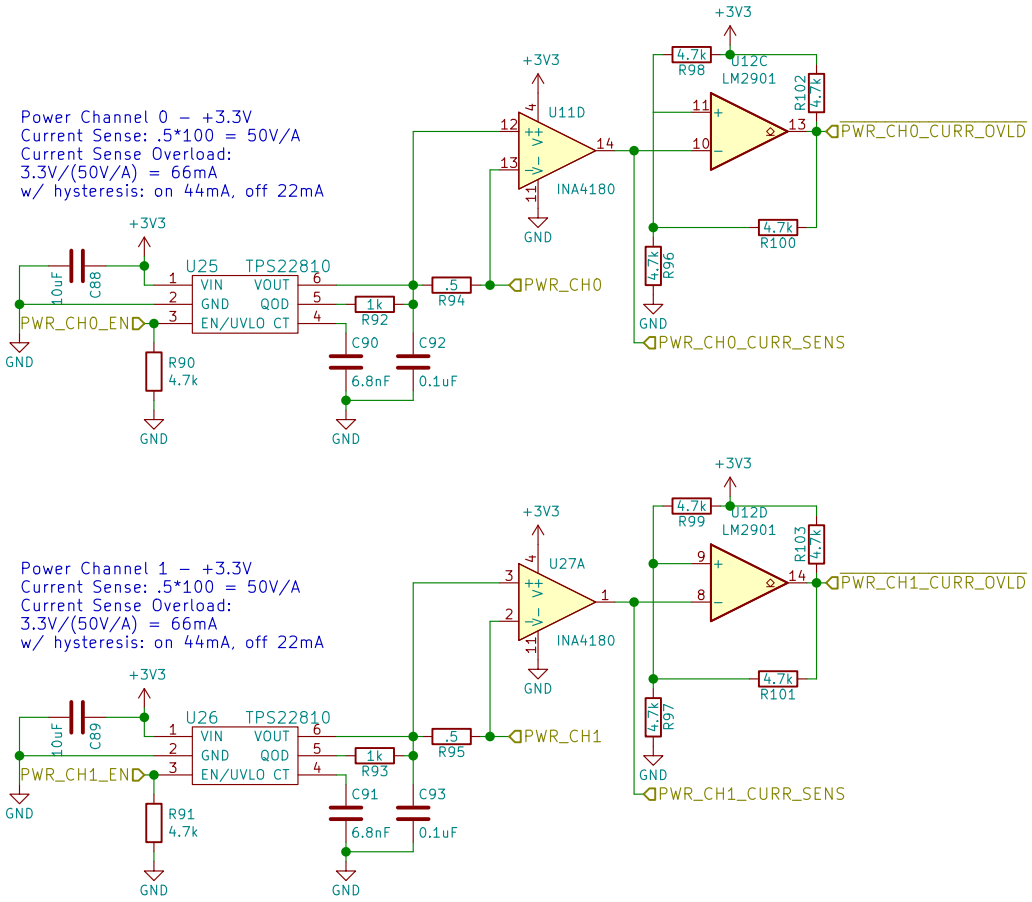
Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project

Sheet: /Power/
File: Power.sch

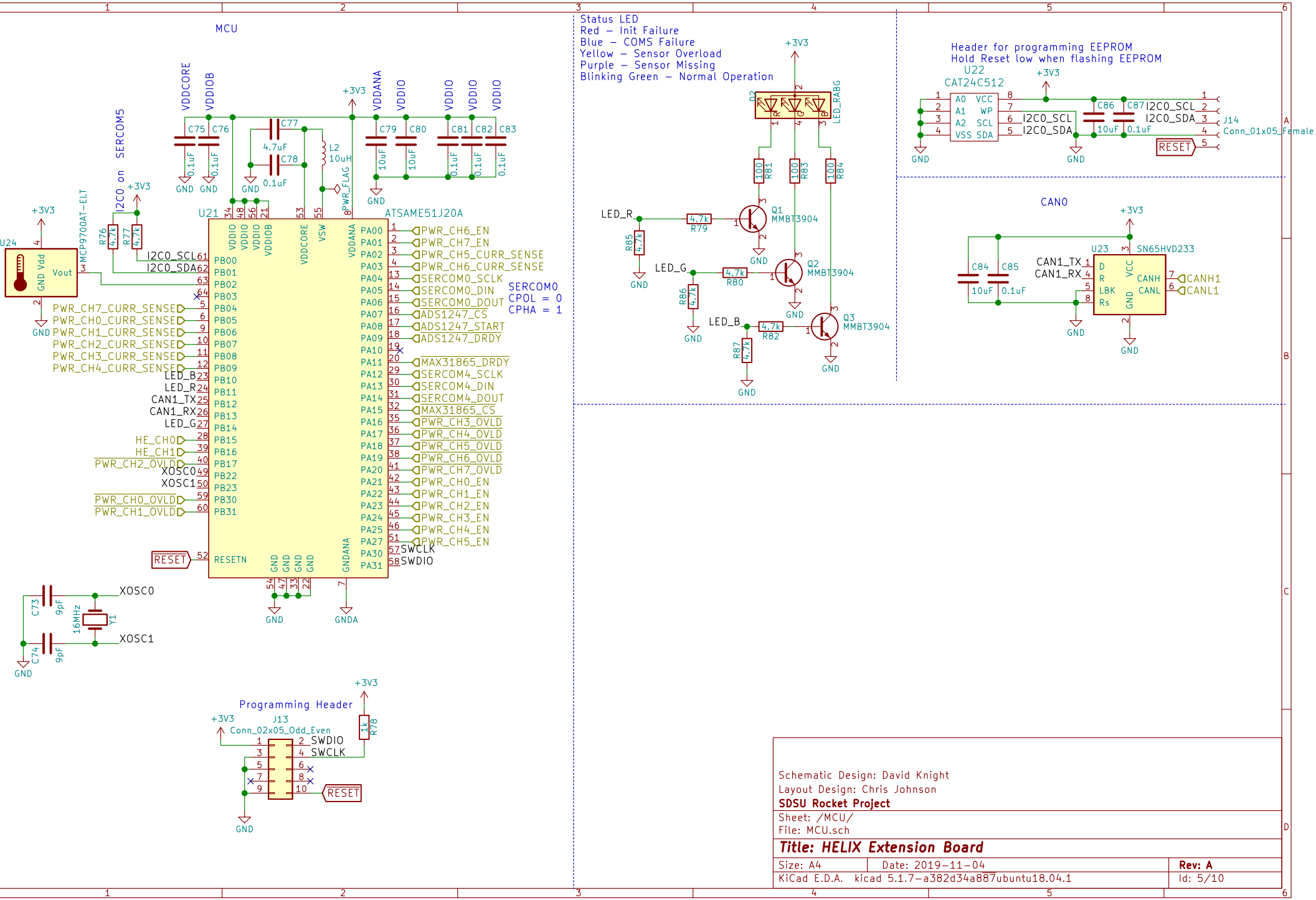
Title: HELIX Extension Board

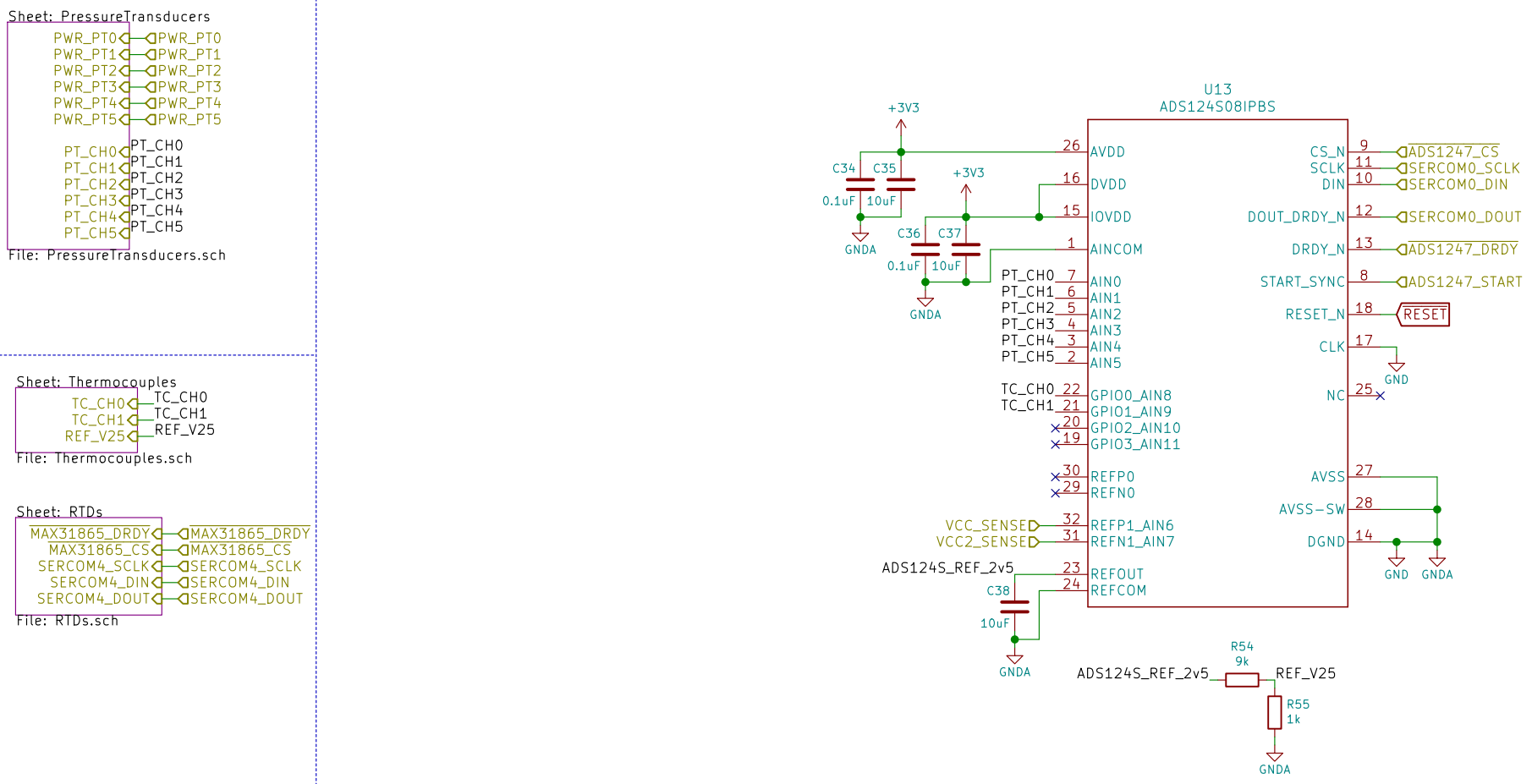
Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1		Id: 2/10


Power Channel 0 – Vcc
Current Sense: .5*100 = 50V/A
Current Sense Overload:
3.3V/(50V/A) = 66mA
w/ hysteresis: on 44mA, off 22mA
Power Channel 1 – Vcc
Current Sense: .5*100 = 50V/A
Current Sense Overload:
3.3V/(50V/A) = 66mA
w/ hysteresis: on 44mA, off 22mA
Power Channel 2 – Vcc
Current Sense: .5*100 = 50V/A
Current Sense Overload:
3.3V/(50V/A) = 66mA
w/ hysteresis: on 44mA, off 22mA
Power Channel 3 – Vcc
Current Sense: .5*100 = 50V/A
Current Sense Overload:
3.3V/(50V/A) = 66mA
w/ hysteresis: on 44mA, off 22mA
Power Channel 4 – Vcc
Current Sense: .5*100 = 50V/A
Current Sense Overload:
3.3V/(50V/A) = 66mA
w/ hysteresis: on 44mA, off 22mA
Power Channel 5 – Vcc
Current Sense: .5*100 = 50V/A
Current Sense Overload:
3.3V/(50V/A) = 66mA
w/ hysteresis: on 44mA, off 22mA
Decoupling Caps
U4 TPS22810
U5 TPS22810
U6 TPS22810
U8 TPS22810
U9 TPS22810
U10 TPS22810
U1B INA4180
U1C INA4180
U1D INA4180
U11A INA4180
U11B INA4180
U11C INA4180
U7A LM2901
U7B LM2901
U7C LM2901
U7D LM2901
U12A LM2901
U12B LM2901
PWR_CH0_EN
PWR_CH1_EN
PWR_CH2_EN
PWR_CH3_EN
PWR_CH4_EN
PWR_CH5_EN
PWR_CH0
PWR_CH1
PWR_CH2
PWR_CH3
PWR_CH4
PWR_CH5
PWR_CH0_CURR_SENS
PWR_CH1_CURR_SENS
PWR_CH2_CURR_SENS
PWR_CH3_CURR_SENS
PWR_CH4_CURR_SENS
PWR_CH5_CURR_SENS
PWR_CH0_CURR_OVLD
PWR_CH1_CURR_OVLD
PWR_CH2_CURR_OVLD
PWR_CH3_CURR_OVLD
PWR_CH4_CURR_OVLD
PWR_CH5_CURR_OVLD
Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project
Sheet: /Power/PWR_CH_VCC/
File: PWR_CH_VCC.sch
Title: HELIX Extension Board
Size: A4
Date: 2019-11-04
Rev: A
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1
Id: 3/10



Sheet: /Power/PWR_CH_5v/ File: PWR_CH_5v.sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1		Id: 4/10


MCU
VDDCORE
VDDIOB
VDDANA
VDDIO
C75
C76
C77
4.7uF
C78
0.1uF
L2
10uH
PWR_FLAG
C79
C80
C81
C82
C83
10uF
0.1uF
GND
+3V3
I2C0 on SERCOM5
U21
ATSAME51J20A
U24
MCP9700AT-ELT
Vout
R76
R77
4.7k
I2C0_SCL
I2C0_SDA
PWR_CH7_CURR_SENSE
PWR_CH0_CURR_SENSE
PWR_CH1_CURR_SENSE
PWR_CH2_CURR_SENSE
PWR_CH3_CURR_SENSE
PWR_CH4_CURR_SENSE
LED_B
LED_R
CAN1_TX
CAN1_RX
LED_G
HE_CH0
HE_CH1
PWR_CH2_OVLD
XOSC0
XOSC1
PWR_CH0_OVLD
PWR_CH1_OVLD
RESET
RESETN
SERCOM0
CPOL = 0
CPHA = 1
SERCOM0_SCLK
SERCOM0_DIN
SERCOM0_DOUT
ADS1247_CS
ADS1247_START
ADS1247_DRDY
MAX31865_DRDY
SERCOM4_SCLK
SERCOM4_DIN
SERCOM4_DOUT
MAX31865_CS
PWR_CH3_OVLD
PWR_CH4_OVLD
PWR_CH5_OVLD
PWR_CH6_OVLD
PWR_CH7_OVLD
PWR_CH0_EN
PWR_CH1_EN
PWR_CH2_EN
PWR_CH3_EN
PWR_CH4_EN
PWR_CH5_EN
SWCLK
SWDIO
PWR_CH6_EN
PWR_CH7_EN
PWR_CH5_CURR_SENSE
PWR_CH6_CURR_SENSE
C73
C74
9pF
16MHz
Y1
Programming Header
J13
Conn_02x05_Odd_Even
R78
1k
Status LED
Red – Init Failure
Blue – COMS Failure
Yellow – Sensor Overload
Purple – Sensor Missing
Blinking Green – Normal Operation
D2
LED_RABG
R81
R83
R84
100
Q1
Q2
Q3
MMBT3904
R79
R80
R82
R85
R86
R87
Header for programming EEPROM
Hold Reset low when flashing EEPROM
U22
CAT24C512
A0
A1
A2
VSS
VCC
WP
SCL
SDA
C86
C87
J14
Conn_01x05_Female
CAN0
U23
SN65HVD233
C84
C85
D
R
LBK
Rs
CANH
CANL
CANH1
CANL1
Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project
Sheet: /MCU/
File: MCU.sch
Title: HELIX Extension Board
Size: A4
Date: 2019-11-04
Rev: A
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1
Id: 5/10



Schematic Design: David Knight
Layout Design: Chris Johnson
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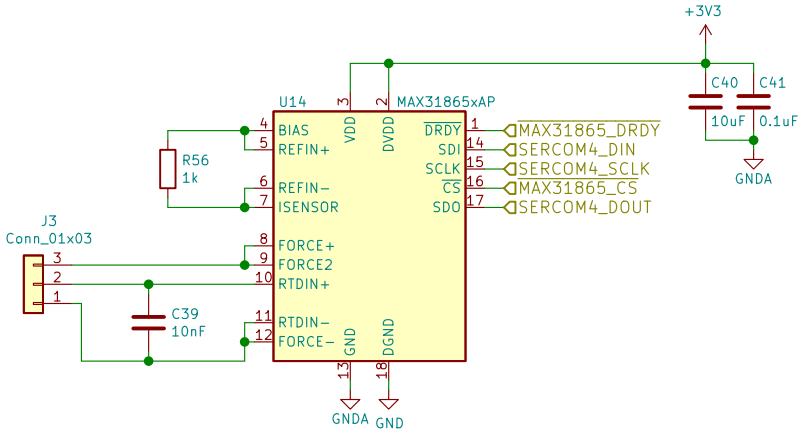
Sheet: /Sensors/
File: Sensors.sch

Title: HELIX Extension Board

Size: A4	Date: 2020-01-10	**Rev: A**
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1		Id: 6/10



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Layout Design: Chris Johnson
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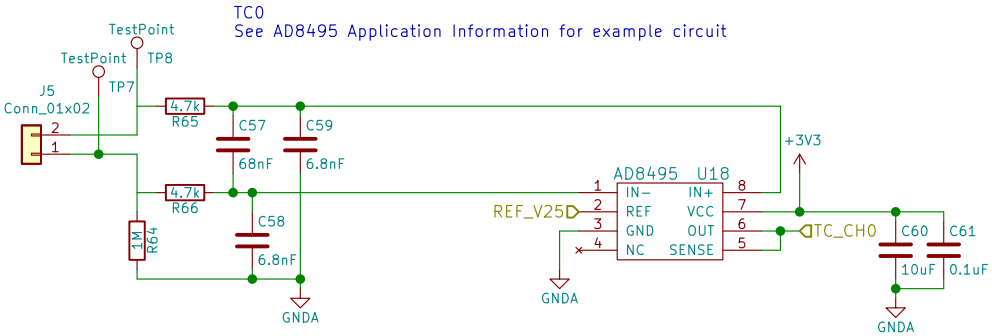
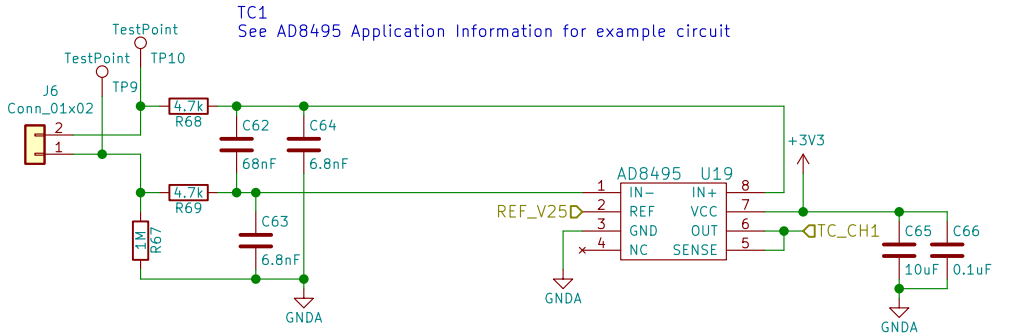
Sheet: /Sensors/RTDs/
File: RTDs.sch

Title: HELIX Extension Board

Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1		Id: 7/10

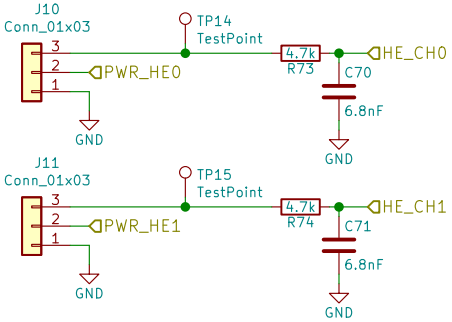




Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project
Sheet: /Sensors/Thermocouples/
File: Thermocouples.sch

Title: HELIX Extension Board

Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1		Id: 8/10

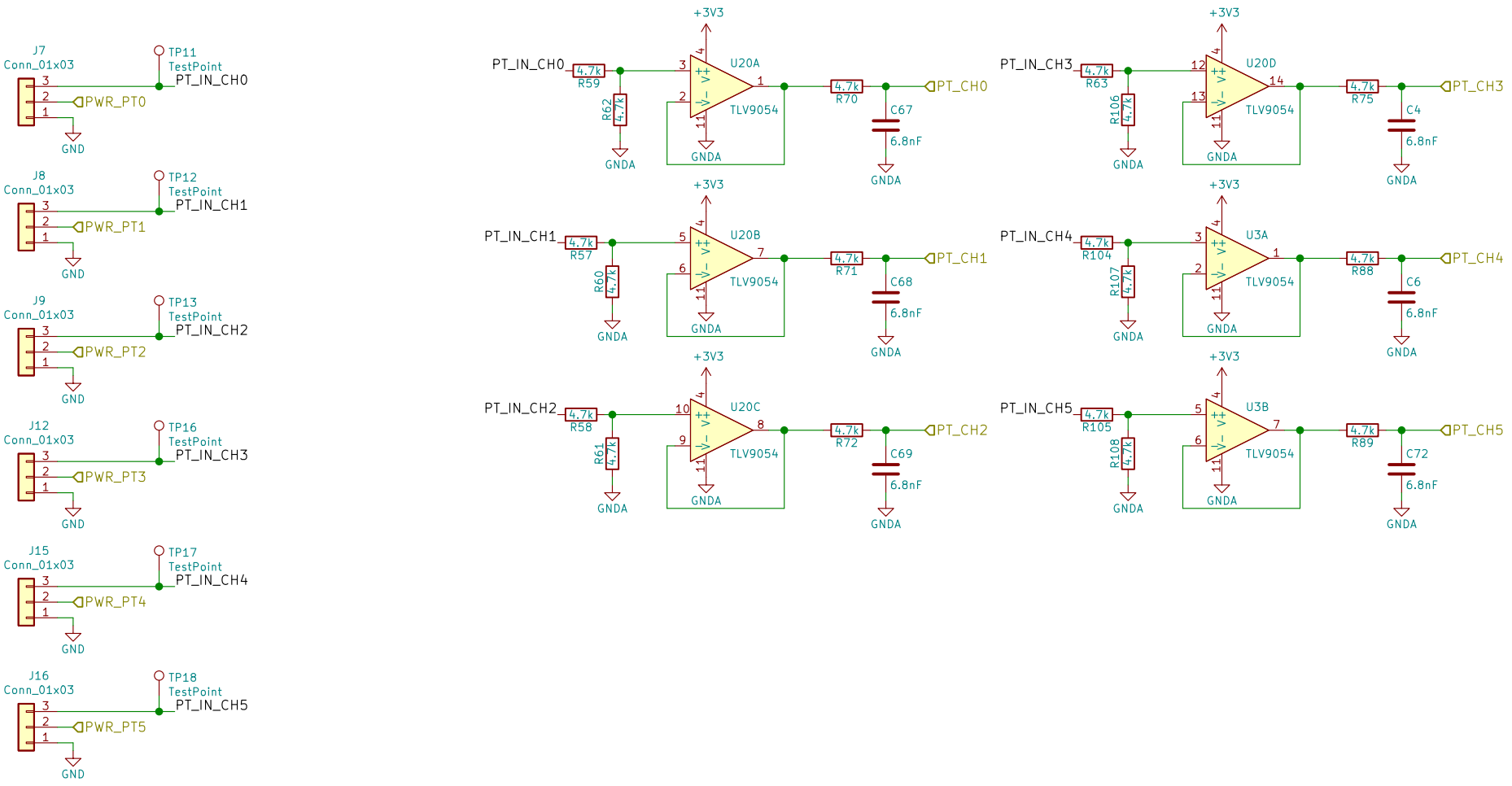


Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project

Sheet: /Sensors/HallEffect/
File: HallEffect.sch

Title: HELIX Extension Board

Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1		Id: 9/10



Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project
Sheet: /Sensors/PressureTransducers/
File: PressureTransducers.sch

Title: HELIX Extension Board

Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.7-a382d34a887ubuntu18.04.1		Id: 10/10