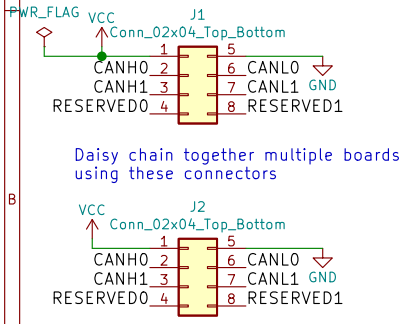
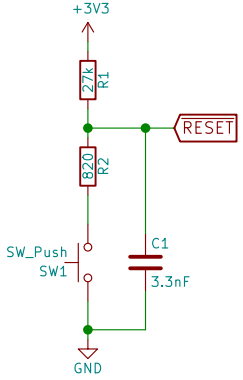




Sheet: Power

PWR_CH0
PWR_CH0_EN
PWR_CH0_OVLD
PWR_CH0_CURR_SENSE
PWR_CH1
PWR_CH1_EN
PWR_CH1_OVLD
PWR_CH1_CURR_SENSE
PWR_CH2
PWR_CH2_EN
PWR_CH2_OVLD
PWR_CH2_CURR_SENSE
PWR_CH3
PWR_CH3_EN
PWR_CH3_OVLD
PWR_CH3_CURR_SENSE
PWR_CH4
PWR_CH4_EN
PWR_CH4_OVLD
PWR_CH4_CURR_SENSE
PWR_CH5
PWR_CH5_EN
PWR_CH5_OVLD
PWR_CH5_CURR_SENSE
PWR_CH6
PWR_CH6_EN
PWR_CH6_OVLD
PWR_CH6_CURR_SENSE
PWR_CH7
PWR_CH7_EN
PWR_CH7_OVLD
PWR_CH7_CURR_SENSE
VCC_SENSE
VCC_CURR_SENSE

File: Power.sch

Sheet: Sensors

ADS1247_SCLK
ADS1247_DOUT
ADS1247_DIN
ADS1247_CS
ADS1247_DRDY
ADS1247_START
ADS1247_CHSEL_S0
ADS1247_CHSEL_S1
PWR_CH0
PWR_CH1
PWR_CH2
PWR_CH3
PWR_CH4
PWR_CH5
PWR_CH6
PWR_CH7
HE_CH0
HE_CH1

File: Sensors.sch

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
ADS1247_SCLK
ADS1247_DOUT
ADS1247_DIN
ADS1247_CS
ADS1247_DRDY
ADS1247_START
ADS1247_CHSEL_S0
ADS1247_CHSEL_S1
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
VCC_SENSE
VCC_CURR_SENSE

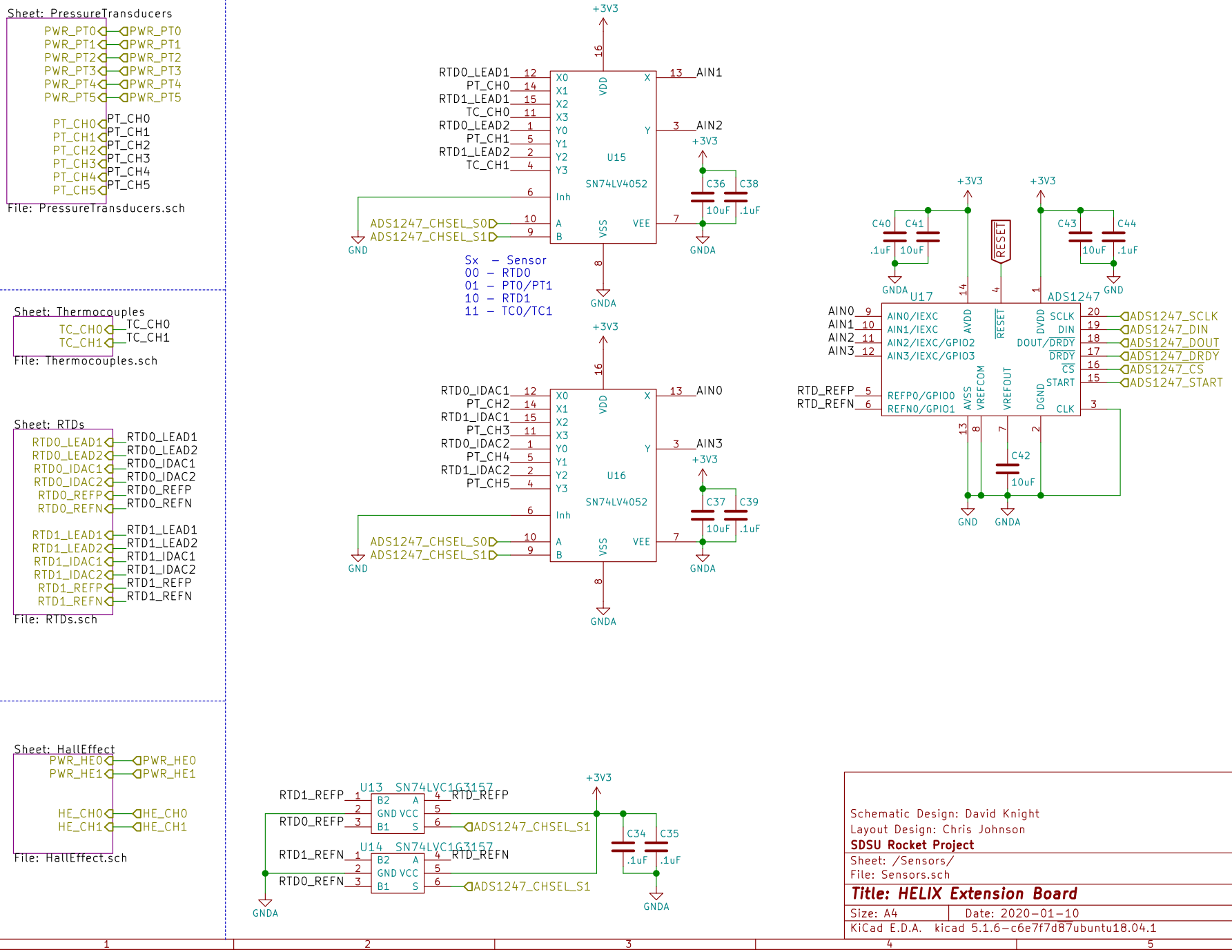
File: MCU.sch

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

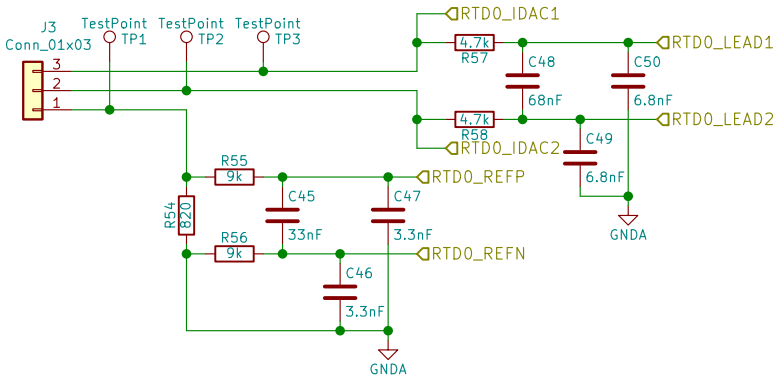
Sheet: /
File: Extention Boards.sch

Title: HELIX Extension Board

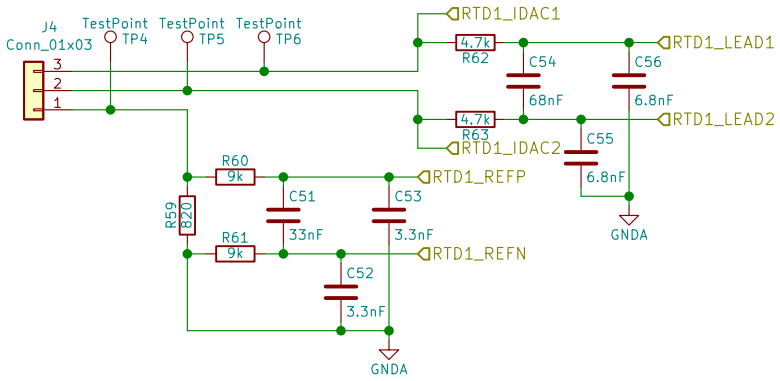
Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.6-c6e7f7d87ubuntu18.04.1		Id: 1/10


Sheet: PressureTransducers
PWR_PT0
PWR_PT1
PWR_PT2
PWR_PT3
PWR_PT4
PWR_PT5
PT_CH0
PT_CH1
PT_CH2
PT_CH3
PT_CH4
PT_CH5
File: PressureTransducers.sch
Sheet: Thermocouples
TC_CH0
TC_CH1
File: Thermocouples.sch
Sheet: RTDs
RTD0_LEAD1
RTD0_LEAD2
RTD0_IDAC1
RTD0_IDAC2
RTD0_REFP
RTD0_REFN
RTD1_LEAD1
RTD1_LEAD2
RTD1_IDAC1
RTD1_IDAC2
RTD1_REFP
RTD1_REFN
File: RTDs.sch
Sheet: HallEffect
PWR_HE0
PWR_HE1
HE_CH0
HE_CH1
File: HallEffect.sch
+3V3
U15
SN74LV4052
RTD0_LEAD1
PT_CH0
RTD1_LEAD1
TC_CH0
RTD0_LEAD2
PT_CH1
RTD1_LEAD2
TC_CH1
AIN1
AIN2
ADS1247_CHSEL_S0
ADS1247_CHSEL_S1
GND
GNDA
C36
C38
10uF
.1uF
Sx – Sensor
00 – RTD0
01 – PT0/PT1
10 – RTD1
11 – TC0/TC1
U16
RTD0_IDAC1
PT_CH2
RTD1_IDAC1
PT_CH3
RTD0_IDAC2
PT_CH4
RTD1_IDAC2
PT_CH5
AIN0
AIN3
C37
C39
U17
ADS1247
AIN0
AIN1
AIN2
AIN3
RTD_REFP
RTD_REFN
RESET
C40
C41
C42
C43
C44
ADS1247_SCLK
ADS1247_DIN
ADS1247_DOUT
ADS1247_DRDY
ADS1247_CS
ADS1247_START
U13
SN74LVC1G3157
U14
SN74LVC1G3157
C34
C35
Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project
Sheet: /Sensors/
File: Sensors.sch
Title: HELIX Extension Board
Size: A4
Date: 2020-01-10
Rev: A
KiCad E.D.A. kicad 5.1.6-c6e7f7d87ubuntu18.04.1
Id: 2/10

RTD0
Excitation current: 1mA
Leave lead 3 disconnected if using a 2 wire RTD
See ADS124x datasheet section 10.2.1 for reference circuit



RTD1
Excitation current: 1mA
Leave lead 3 disconnected if using a 2 wire RTD
See ADS124x datasheet section 10.2.1 for reference circuit



Schematic Design: David Knight
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Sheet: /Sensors/RTDs/
File: RTDs.sch

Title: HELIX Extension Board

Size: A4	Date: 2019-11-04	**Rev: A**
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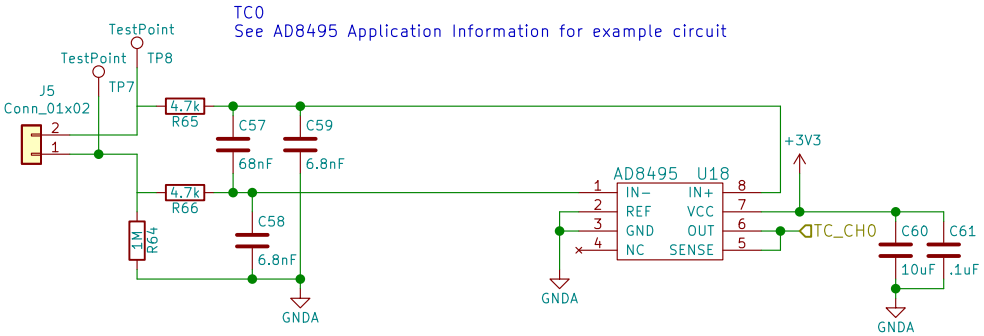
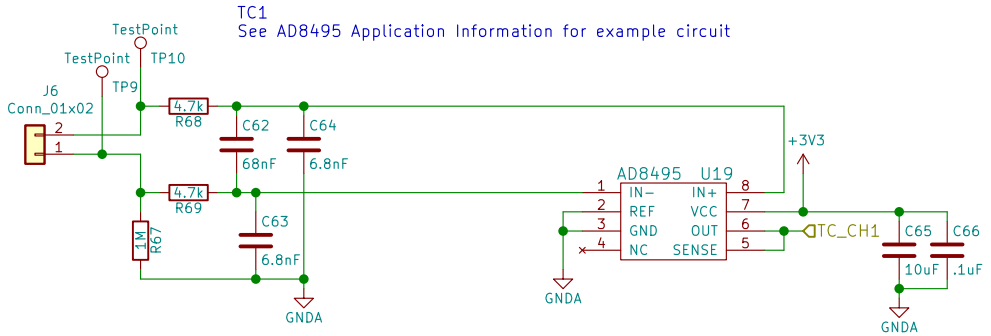
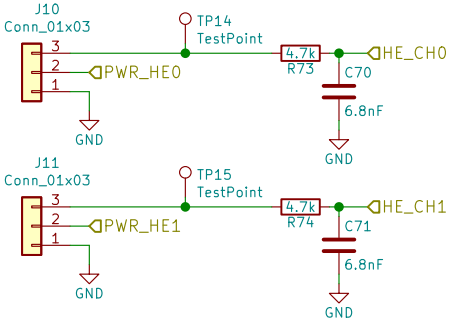




Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project
Sheet: /Sensors/Thermocouples/
File: Thermocouples.sch

Title: HELIX Extension Board

Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.6-c6e7f7d87ubuntu18.04.1		Id: 4/10



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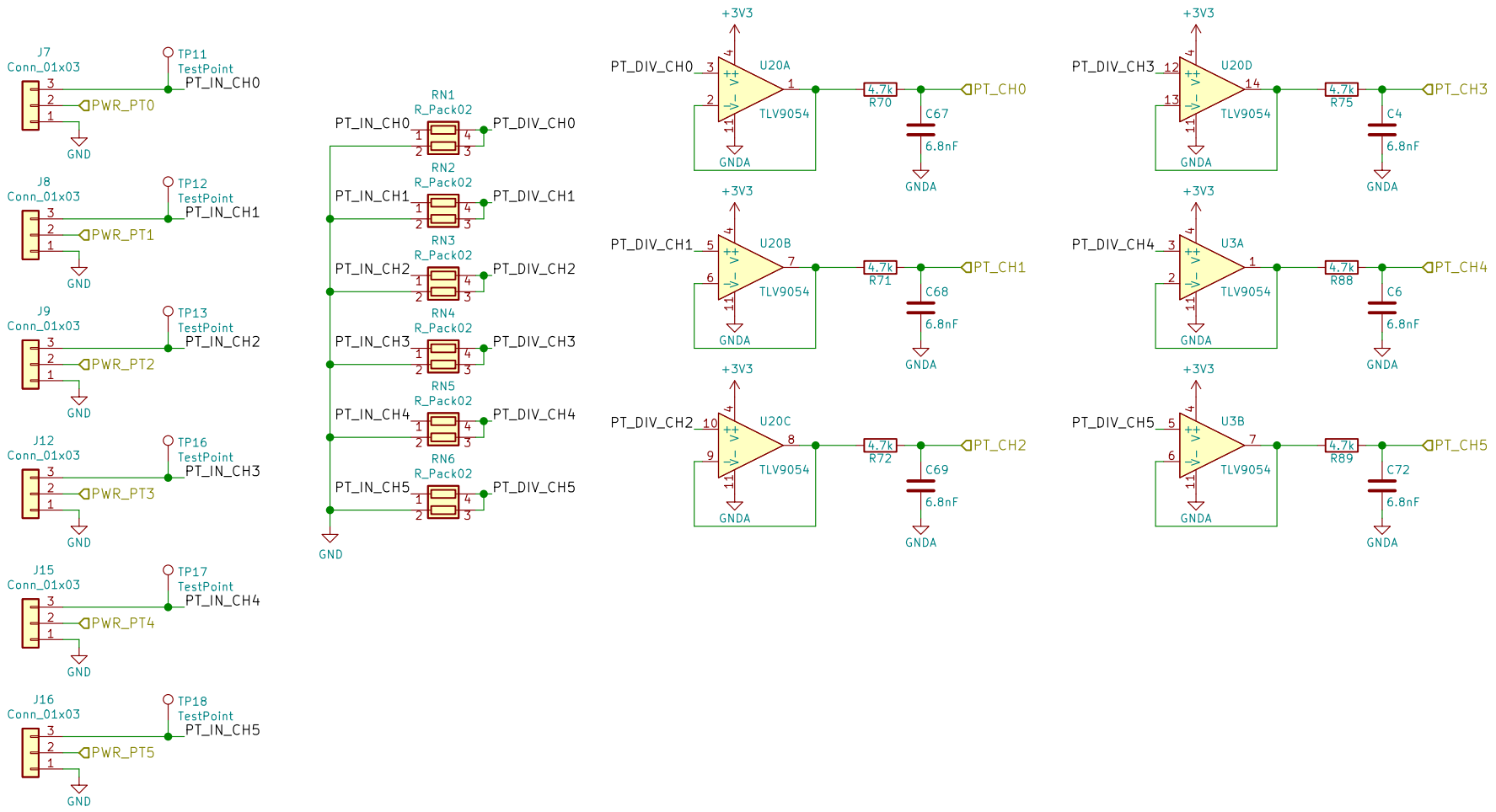
Sheet: /Sensors/HallEffect/
File: HallEffect.sch

Title: HELIX Extension Board

Size: A4	Date: 2019-11-04	**Rev: A**
KiCad E.D.A. kicad 5.1.6-c6e7f7d87ubuntu18.04.1		Id: 5/10



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 5.1.6-c6e7f7d87ubuntu18.04.1		Id: 6/10

Sheet: PWR_CH_VCC

PWR_CH0 PWR_CH0
PWR_CH0_EN PWR_CH0_EN
PWR_CH0_CURR_SENS PWR_CH0_CURR_SENS
PWR_CH0_CURR_OVLD PWR_CH0_CURR_OVLD

PWR_CH1 PWR_CH1
PWR_CH1_EN PWR_CH1_EN
PWR_CH1_CURR_SENS PWR_CH1_CURR_SENS
PWR_CH1_CURR_OVLD PWR_CH1_CURR_OVLD

PWR_CH2 PWR_CH2
PWR_CH2_EN PWR_CH2_EN
PWR_CH2_CURR_SENS PWR_CH2_CURR_SENS
PWR_CH2_CURR_OVLD PWR_CH2_CURR_OVLD

PWR_CH3 PWR_CH3
PWR_CH3_EN PWR_CH3_EN
PWR_CH3_CURR_SENS PWR_CH3_CURR_SENS
PWR_CH3_CURR_OVLD PWR_CH3_CURR_OVLD

PWR_CH4 PWR_CH4
PWR_CH4_EN PWR_CH4_EN
PWR_CH4_CURR_SENS PWR_CH4_CURR_SENS
PWR_CH4_CURR_OVLD PWR_CH4_CURR_OVLD

PWR_CH5 PWR_CH5
PWR_CH5_EN PWR_CH5_EN
PWR_CH5_CURR_SENS PWR_CH5_CURR_SENS
PWR_CH5_CURR_OVLD PWR_CH5_CURR_OVLD

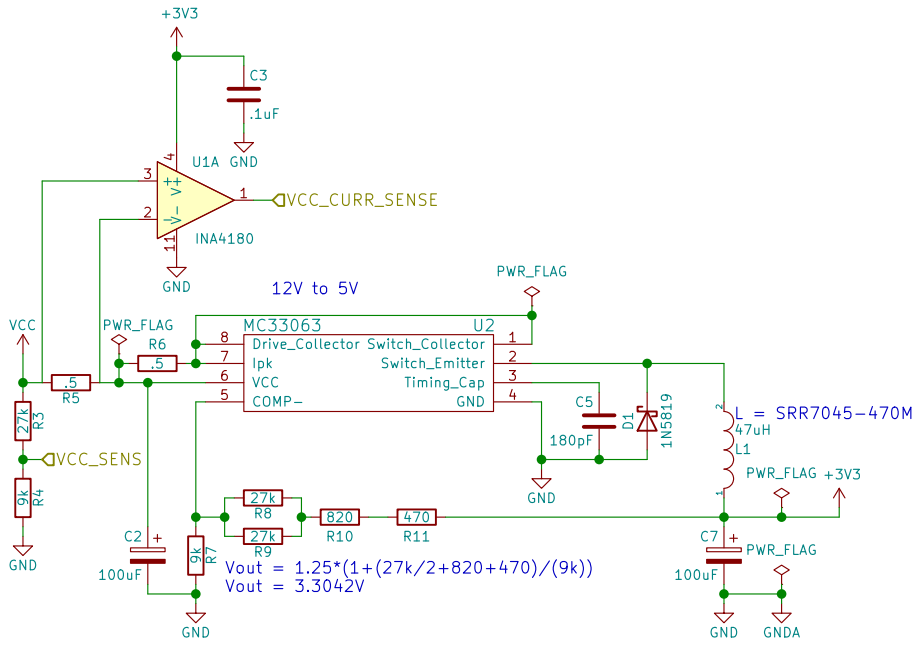
File: PWR_CH_VCC.sch

Sheet: PWR_CH_5v

PWR_CH0 PWR_CH6
PWR_CH0_EN PWR_CH6_EN
PWR_CH0_CURR_SENS PWR_CH6_CURR_SENS
PWR_CH0_CURR_OVLD PWR_CH6_CURR_OVLD

PWR_CH1 PWR_CH7
PWR_CH1_EN PWR_CH7_EN
PWR_CH1_CURR_SENS PWR_CH7_CURR_SENS
PWR_CH1_CURR_OVLD PWR_CH7_CURR_OVLD

File: PWR_CH_5v.sch

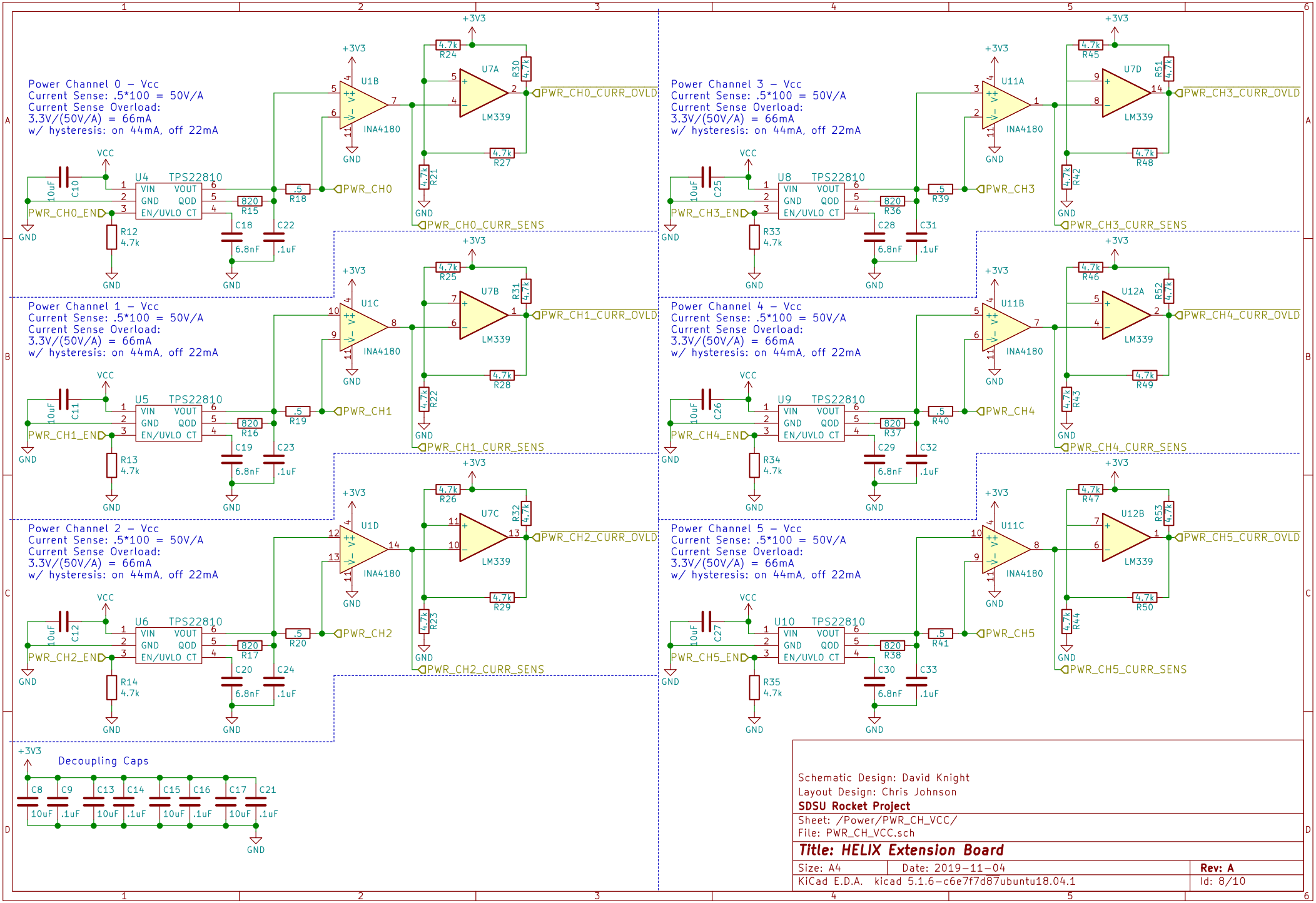


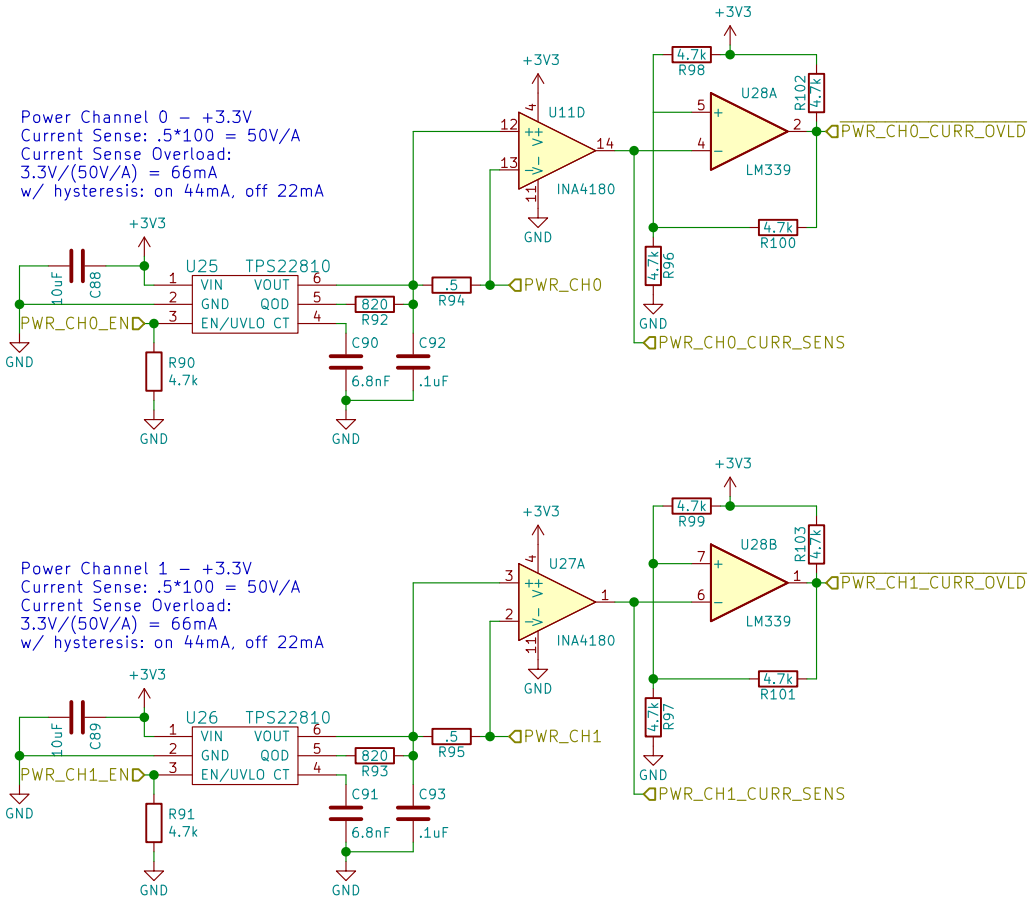
Schematic Design: David Knight
Layout Design: Chris Johnson
SDSU Rocket Project

Sheet: /Power/
File: Power.sch

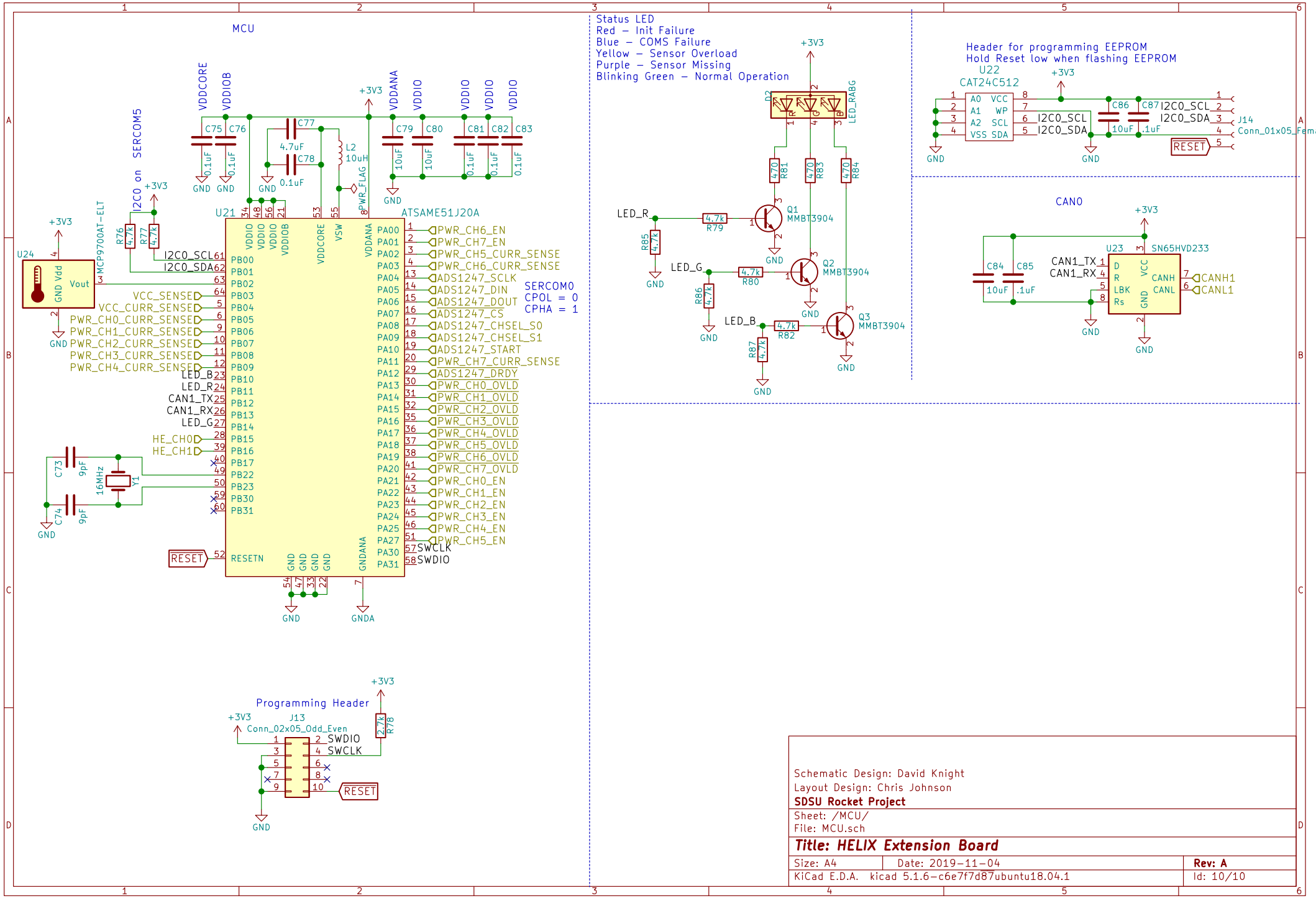
Title: HELIX Extension Board

Size: A4	Date: 2019−11−04	**Rev: A**
KiCad E.D.A. kicad 5.1.6−c6e7f7d87ubuntu18.04.1		Id: 7/10


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
PWR_CH0_CURR_OVLD
PWR_CH1_CURR_OVLD
PWR_CH2_CURR_OVLD
PWR_CH3_CURR_OVLD
PWR_CH4_CURR_OVLD
PWR_CH5_CURR_OVLD
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
PWR_CH1
PWR_CH2
PWR_CH3
PWR_CH4
PWR_CH5
PWR_CH0_EN
PWR_CH1_EN
PWR_CH2_EN
PWR_CH3_EN
PWR_CH4_EN
PWR_CH5_EN
U1B
U1C
U1D
U11A
U11B
U11C
INA4180
U7A
U7B
U7C
U7D
U12A
U12B
LM339
U4
U5
U6
U8
U9
U10
TPS22810
VIN
VOUT
GND
QOD
EN/UVLO
CT
VCC
+3V3
GND
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 5.1.6-c6e7f7d87ubuntu18.04.1
Id: 8/10



Sheet: /Power/PWR_CH_5v/ File: PWR_CH_5v.sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.6-c6e7f7d87ubuntu18.04.1		Id: 9/10


MCU
VDDCORE
VDDIOB
VDDANA
VDDIO
I2C0 on SERCOM5
U21
ATSAME51J20A
SERCOM0
CPOL = 0
CPHA = 1
U24
MCP9700AT-ELT
Programming Header
J13
Conn_02x05_Odd_Even
Status LED
Red – Init Failure
Blue – COMS Failure
Yellow – Sensor Overload
Purple – Sensor Missing
Blinking Green – Normal Operation
LED_RABG
Q1
MMBT3904
Q2
MMBT3904
Q3
MMBT3904
Header for programming EEPROM
Hold Reset low when flashing EEPROM
U22
CAT24C512
J14
Conn_01x05_Female
CAN0
U23
SN65HVD233
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 5.1.6-c6e7f7d87ubuntu18.04.1
Id: 10/10