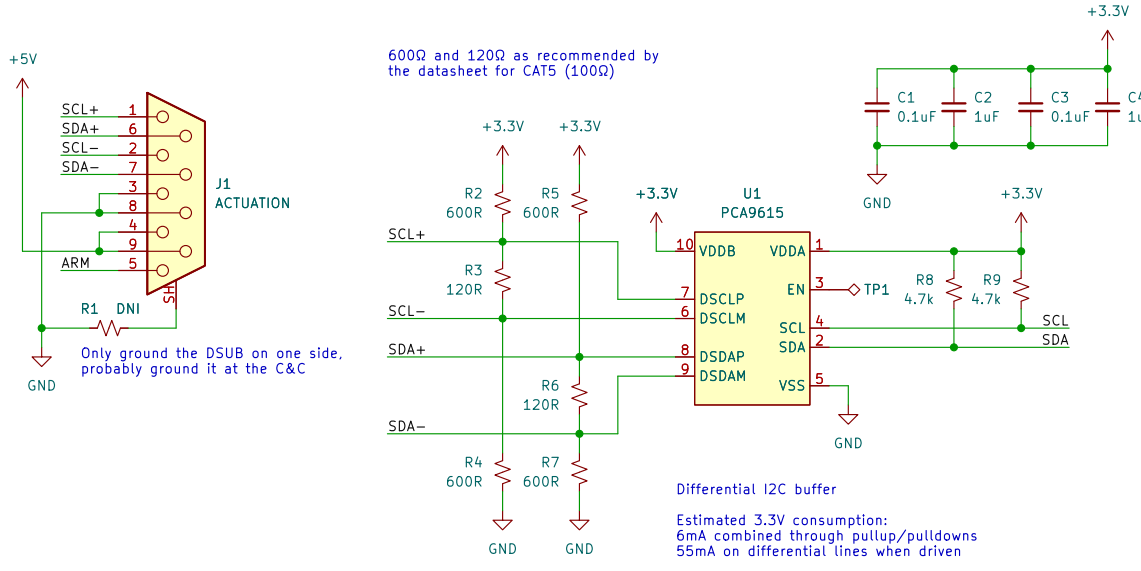
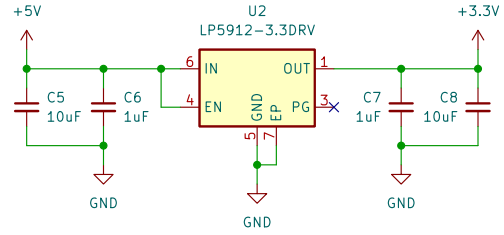
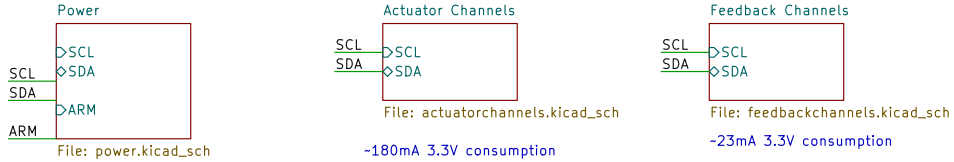


Interfacing (Differential I2C with C&C)



Cold-side Power Supply

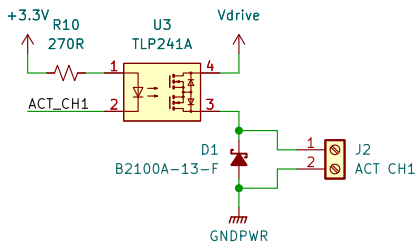


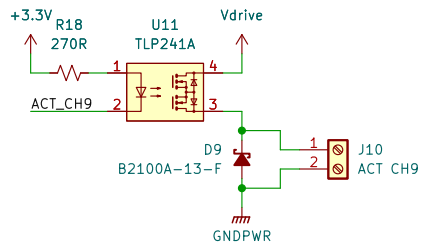
Subsheets

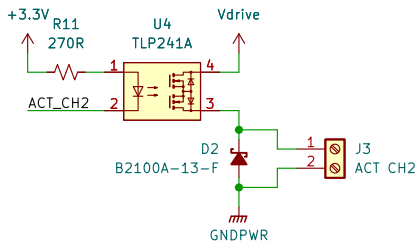
I2C addresses:
Actuator GPIO 1−8: 0x20
Actuator GPIO 9−16: 0x21
Feedback GPIO: 0x23
Current sense ADC: 0x48−0x4F

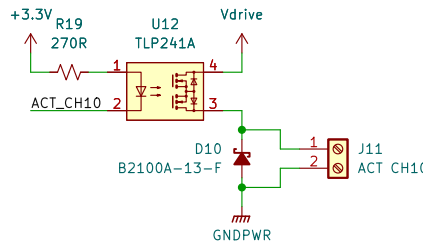
Sheet: /		
File: actuation.kicad_sch		
Title:		
Size: User	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.7−1)−1		Id: 1/4

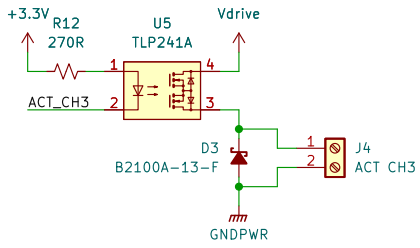
SSRs rated for 2A output, trigger with 5–25mA
Forward voltage of internal LED is 1.1–1.4V
270Ω limits input current to 8.2mA max
 8 channels: 16A output, 66mA input
16 channels: 32A output, 131mA input

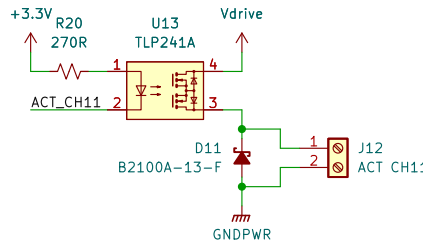


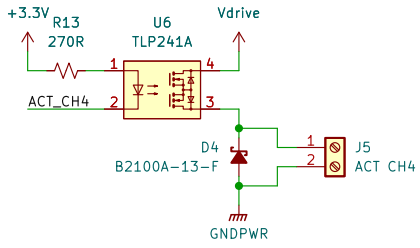


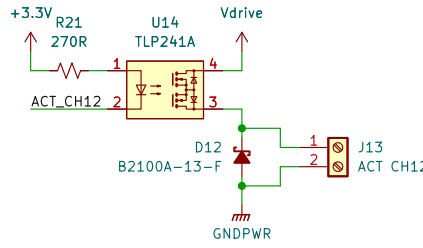


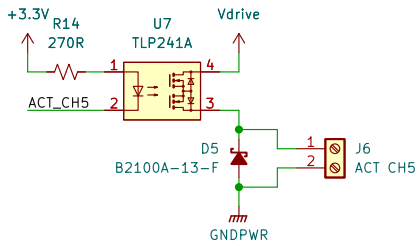


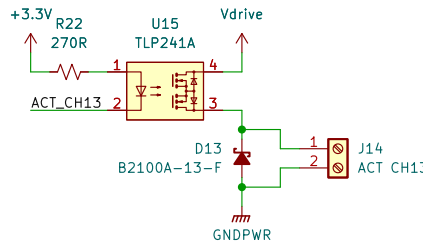


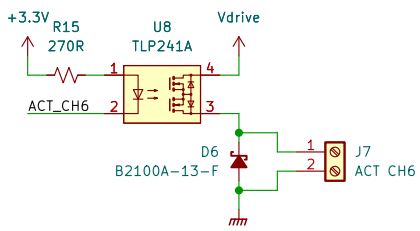


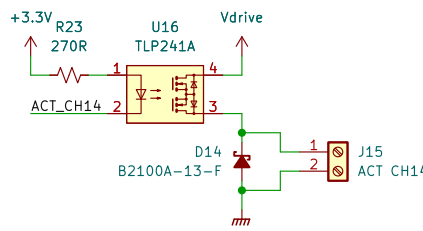


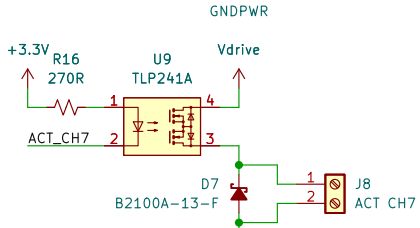


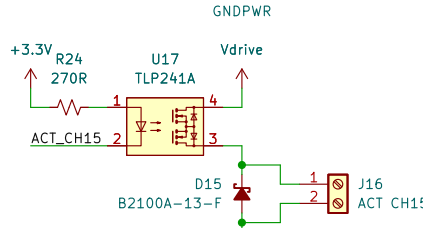


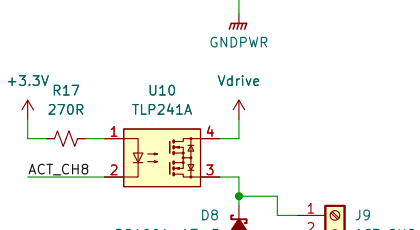


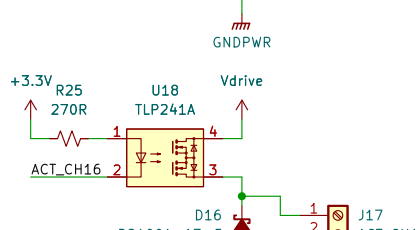






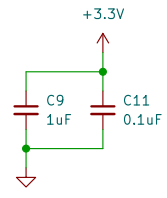






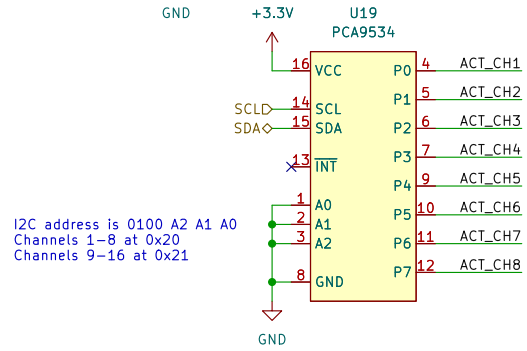
~7.5mA LED drive per channel

Actuation SSRs



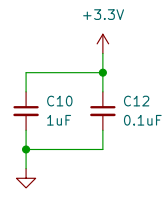
Set ACT_CH3 low to actuate solenoid
HIGH state is minimum 2.9V

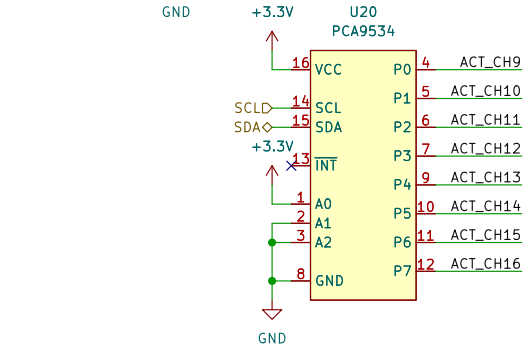
Max sink: 250mA total, 25mA per pin
Max source: 160mA total, 10mA per pin
All on: 66mA SSRs, 22mA LEDs sunk by PCA9534



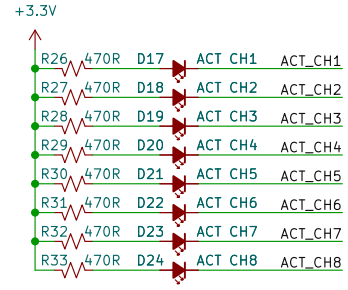
I2C address is 0100 A2 A1 A0
Channels 1–8 at 0x20
Channels 9–16 at 0x21

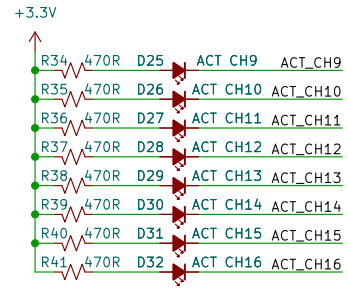
2x GPIO expanders for actuator control





LED on when channel is on
2.8mA per, 44.3mA for 16 channels





Indicator LEDs

Actuation Logic

Sheet: /Actuator Channels/
File: actuatorchannels.kicad_sch

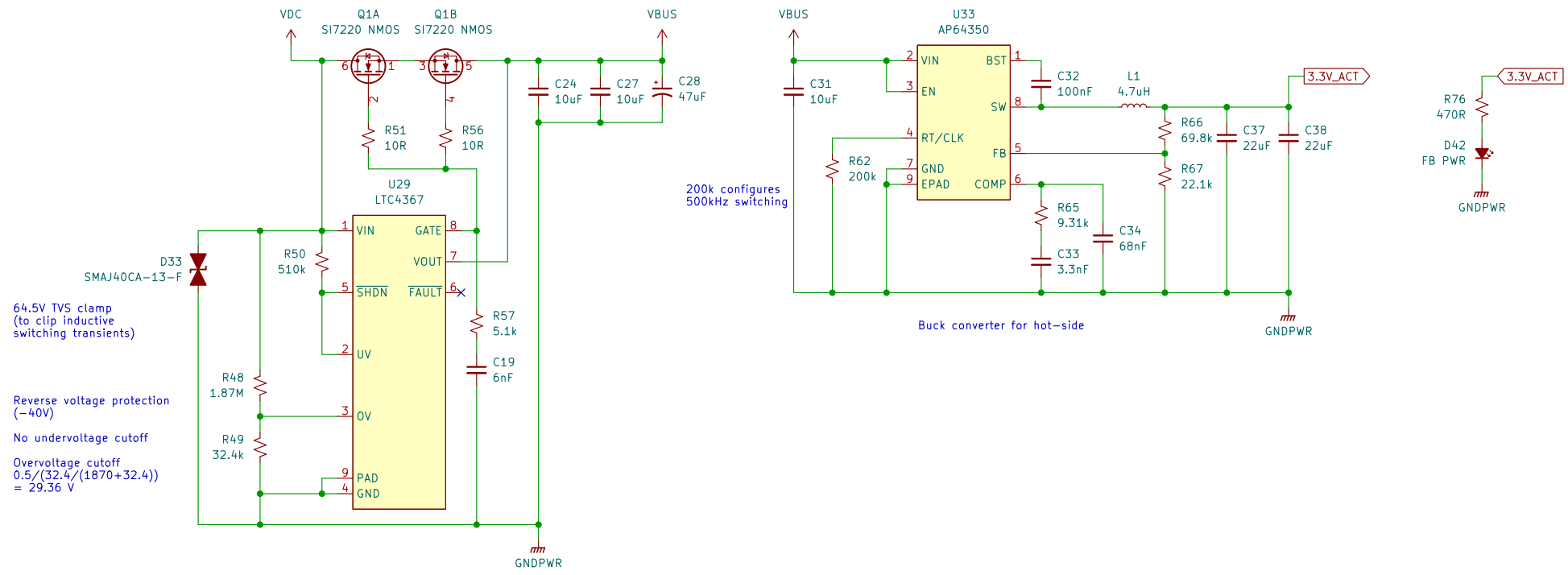
Title:

Size: User	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.7-1)-1		Id: 2/4

VDC comes directly from
the battery (20–28V)

VBUS is a protected
version of the 20–28V

Input voltage 3.8–40V (has UVLO), 3.5A output
60–85% efficient at 24V
This follows the recommended values for 3.3V



64.5V TVS clamp
(to clip inductive
switching transients)

Reverse voltage protection
(–40V)

No undervoltage cutoff

Overvoltage cutoff
0.5/(32.4/(1870+32.4))
= 29.36 V

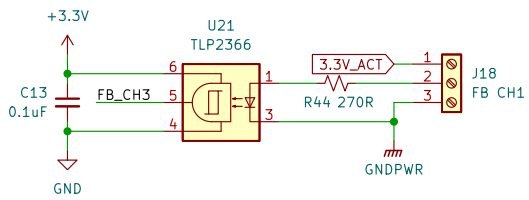
200k configures
500kHz switching

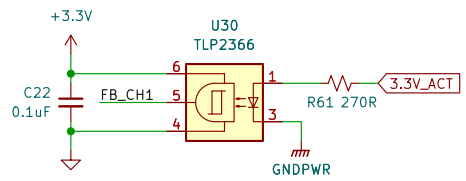
Buck converter for hot–side

Overvoltage/reverse voltage protection

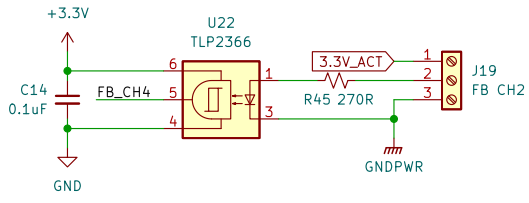
Feedback Power Supply

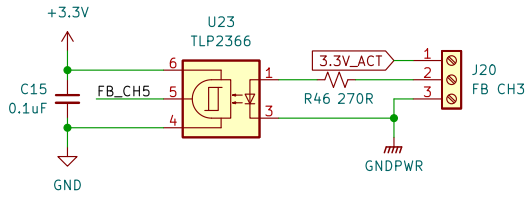
~6.3mA LED drive per channel at Vf=1.65
Up to 55mA total from 3.3V_ACT
Output on FB_CHx is 3mA max
Inverted– limit switch shorted is FB_CHx low

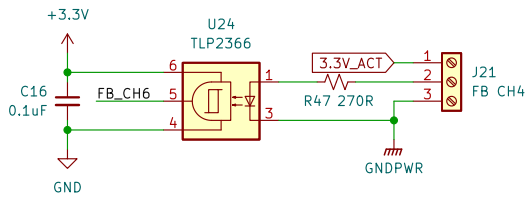




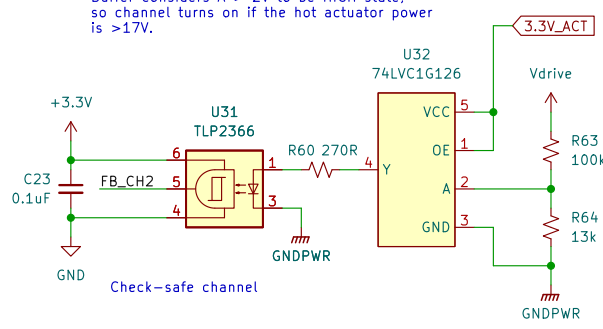
Check–alive channel



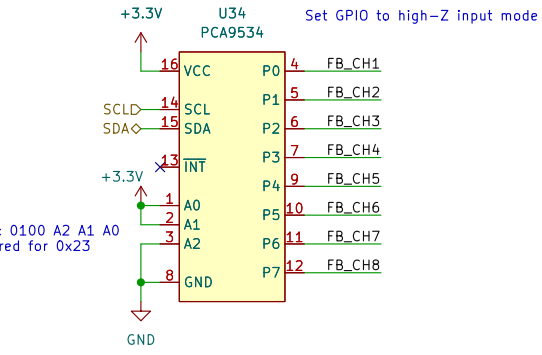




Divides Vdrive (20–28V) down to 2.3–3.2V.
Buffer considers A > 2V to be HIGH state,
so channel turns on if the hot actuator power
is >17V.



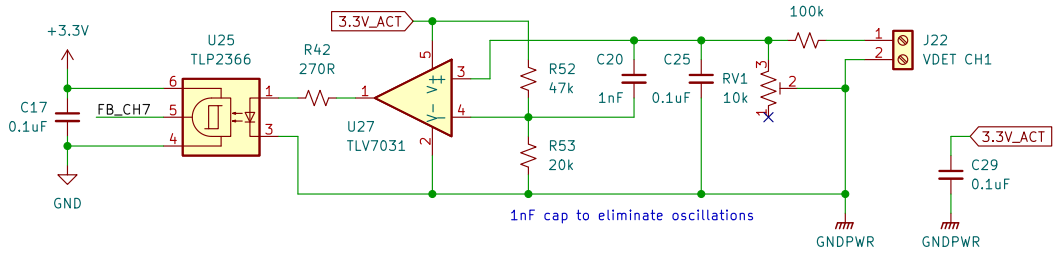
Check–safe channel



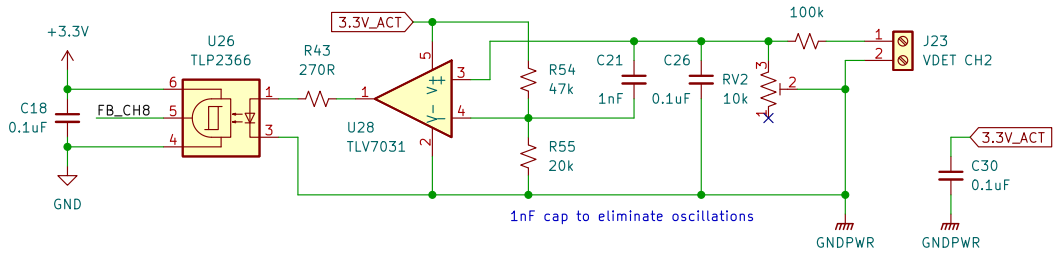
GPIO expander for reading feedback

20k and 47k divide 3.3V down
to 1V for comparator reference

Adjustable VDET threshold detector.
Higher potentiometer values correspond to
lower thresholds. Lowest threshold is 11V.

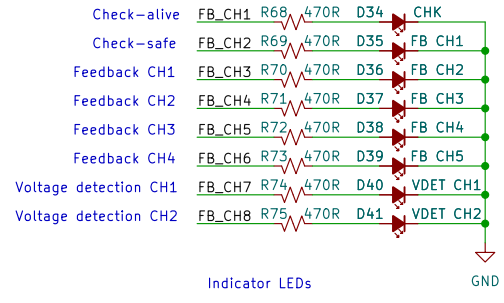


1nF cap to eliminate oscillations



1nF cap to eliminate oscillations

Assuming LED forward voltage of 2V, ~2.8mA per



Indicator LEDs

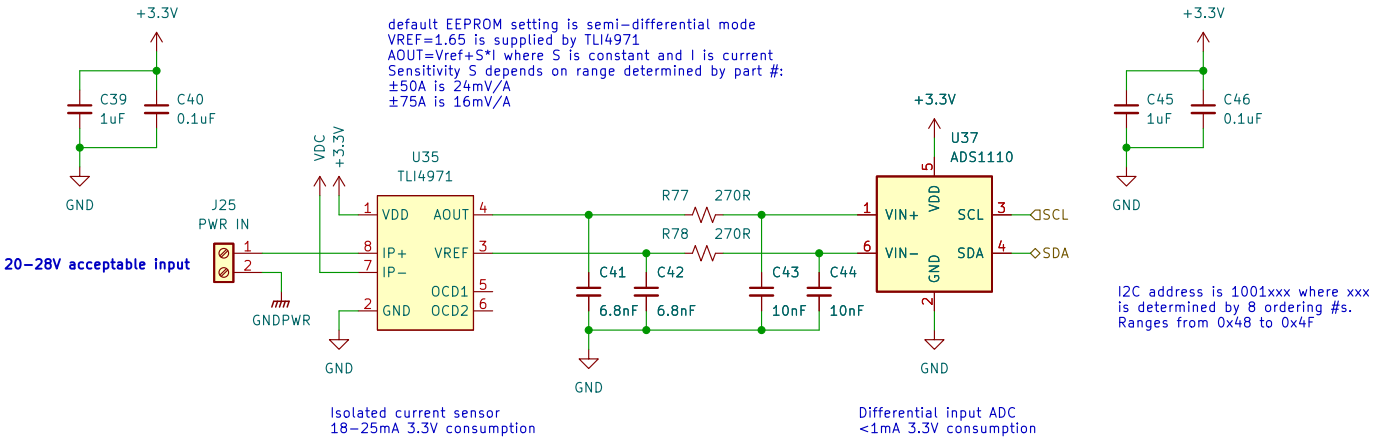
Feedback Logic

Feedback Isolators

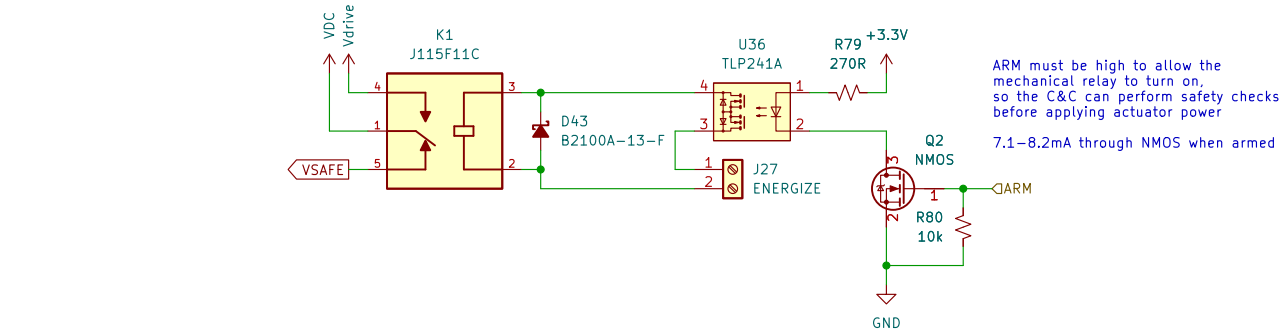
Sheet: /Feedback Channels/
File: feedbackchannels.kicad_sch

Title:

Size: User	Date:	Rev:
KiCad E.D.A. kicad (6.0.7–1)–1		Id: 3/4



Power In and Current Sense



Safing Relay and Arming Logic

Beacons

Sheet: /Power/		
File: power.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (6.0.7-1)-1		Id: 4/4