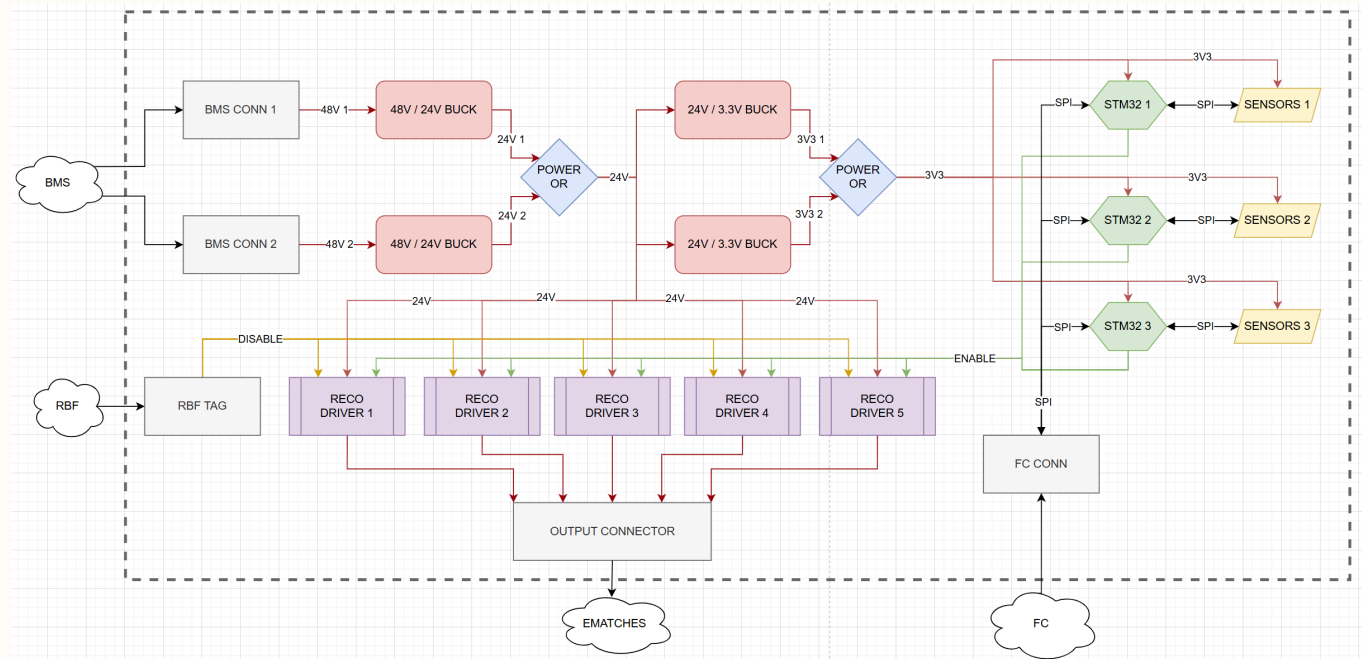


# YJSP

## RECOVERY SYSTEM

RE: Madhawi Alharbi, Pratham Ingale

Primary Sheet.SchDoc



Project: **Recovery\_Board.PrjPcb**

Sheet Title: **Cover.SchDoc**

Size: **A4**  
Schematic Designer: **Madhawi Alharbi**  
PCB Layout Designer: **Pratham Ingale**  
Responsible Engineer: **Pratham Ingale**

Date: **7/22/2026** Revision: **5.0** Sheet: **1** of: **13**

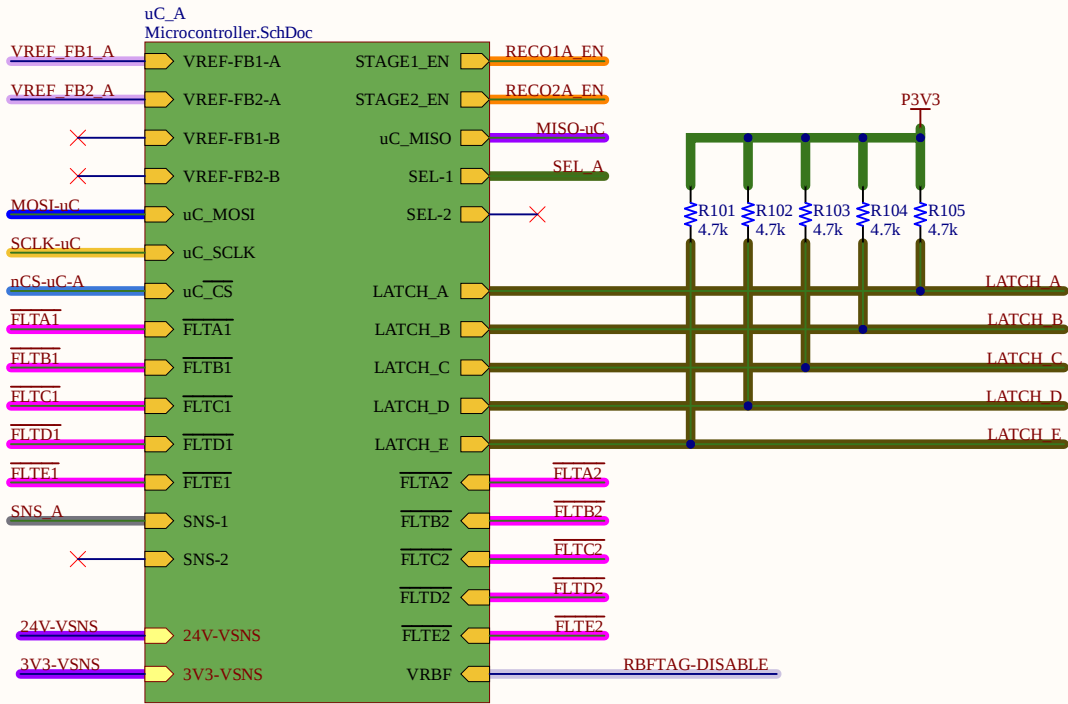
Yellow Jacket Space Program  
Georgia Tech  
Atlanta, GA



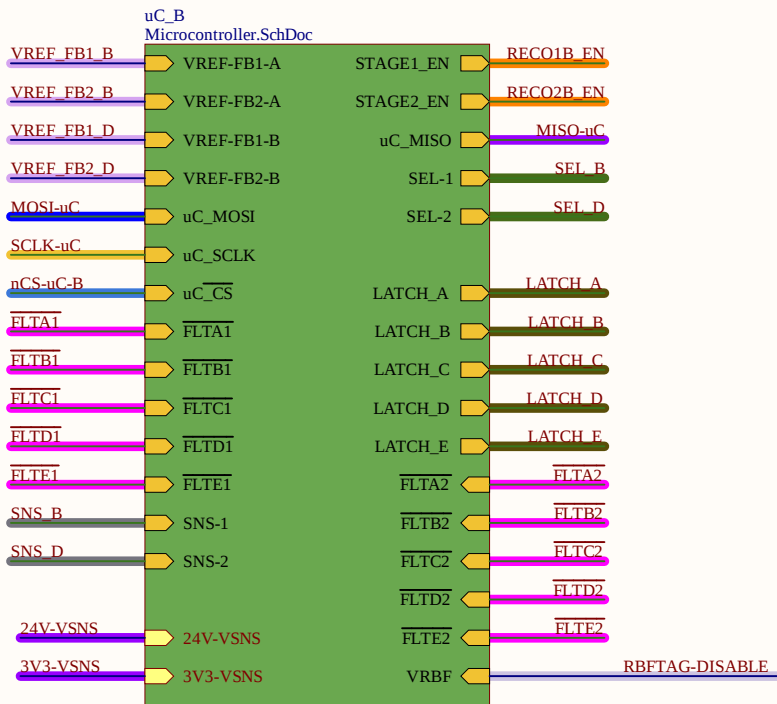
Recovery (RECO)

- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

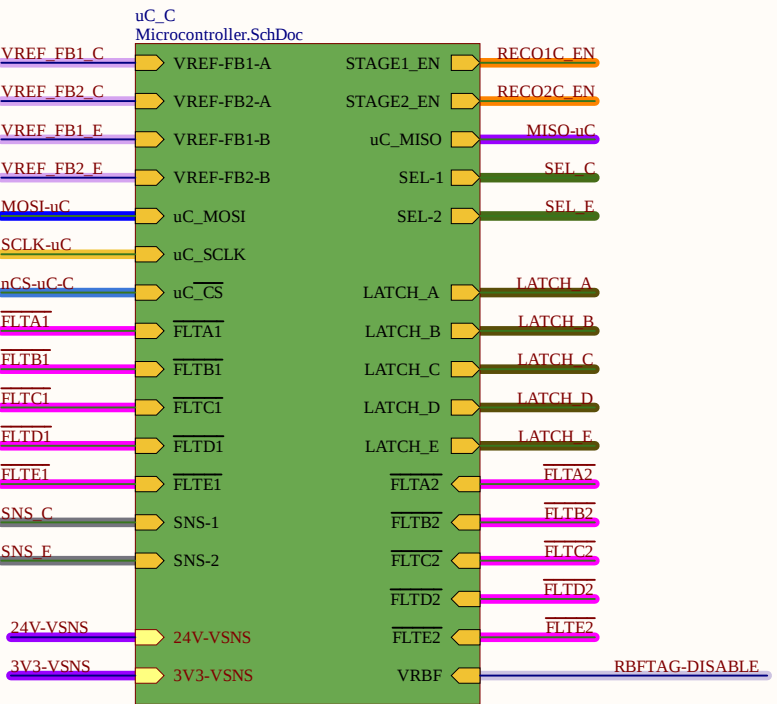
MICROCONTROLLER A



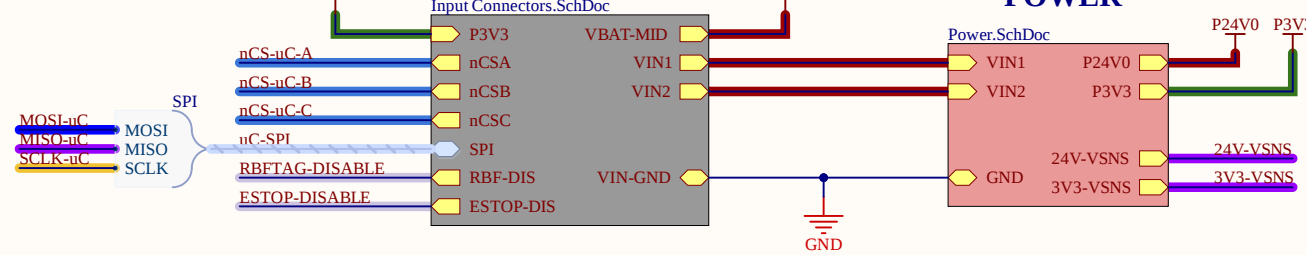
MICROCONTROLLER B



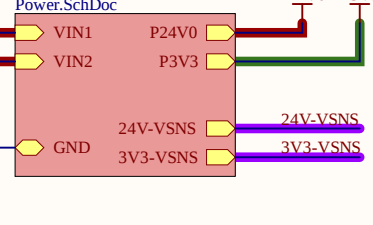
MICROCONTROLLER C



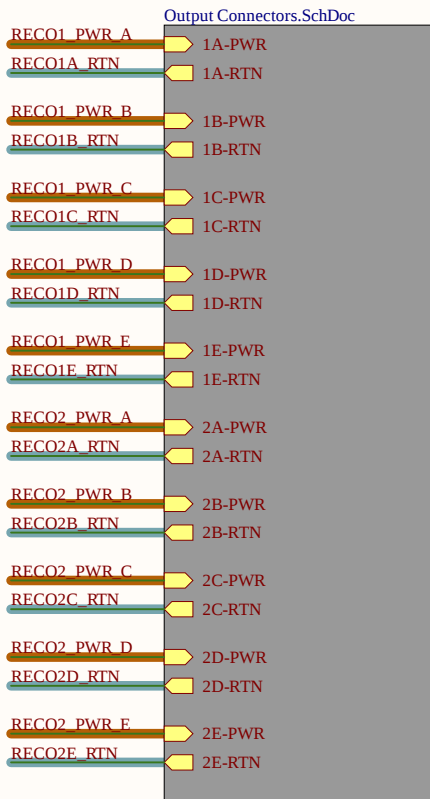
INPUT CONNECTORS



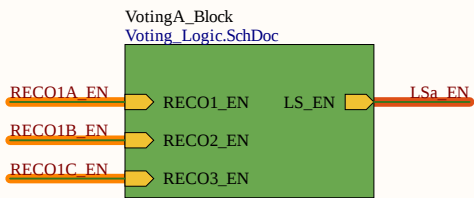
POWER



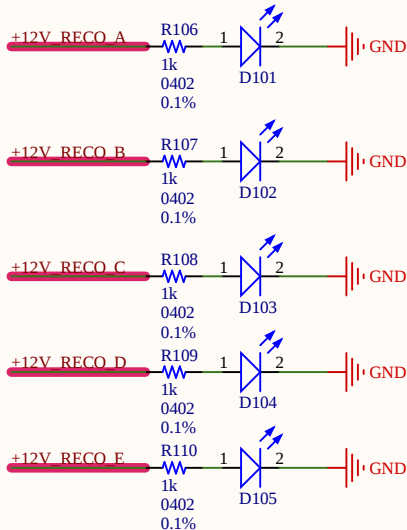
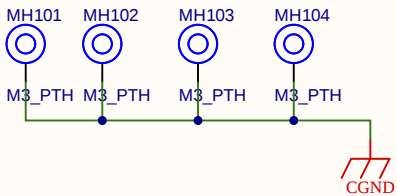
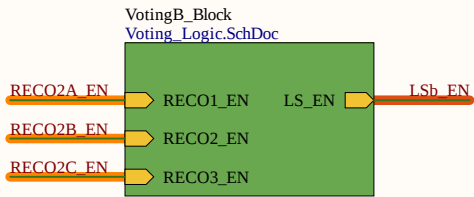
OUTPUT CONNECTORS



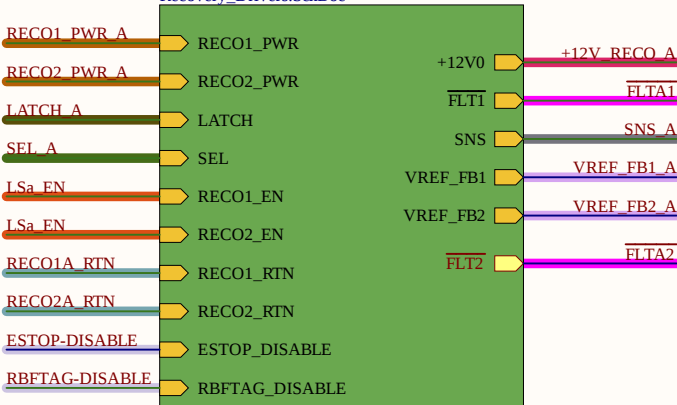
1-FT Stage 1 Voting



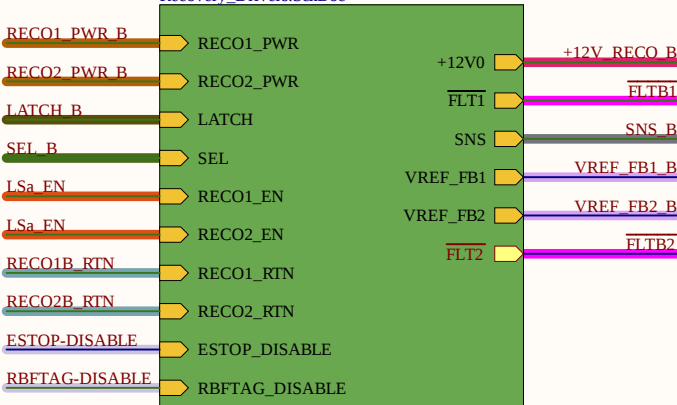
1-FT Stage 2 Voting



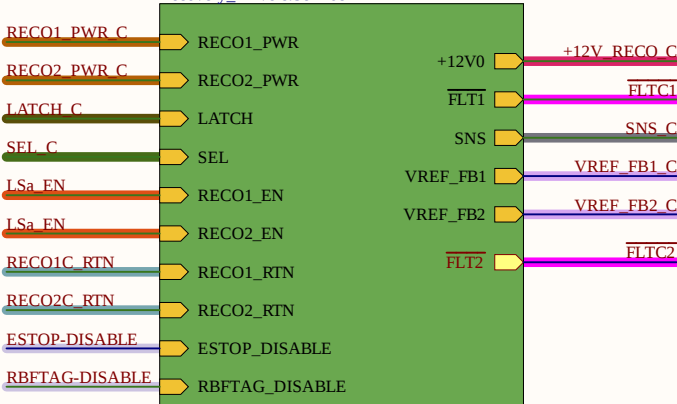
RECOVERY DRIVER A



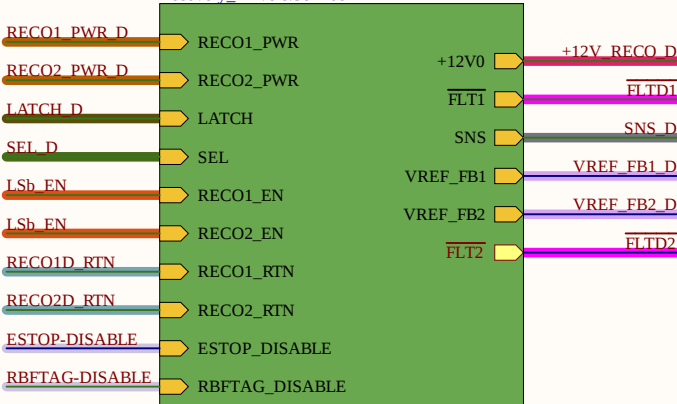
RECOVERY DRIVER B



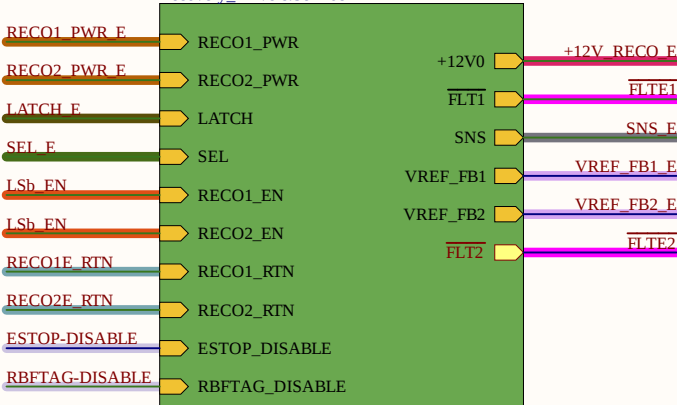
RECOVERY DRIVER C



RECOVERY DRIVER D



RECOVERY DRIVER E

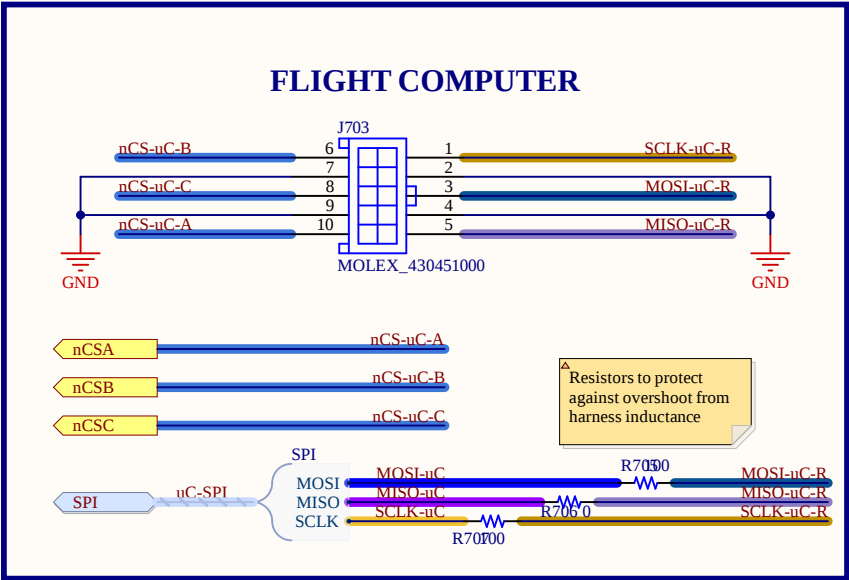
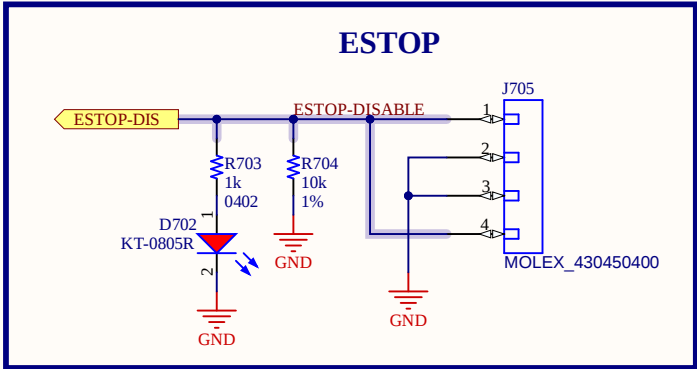
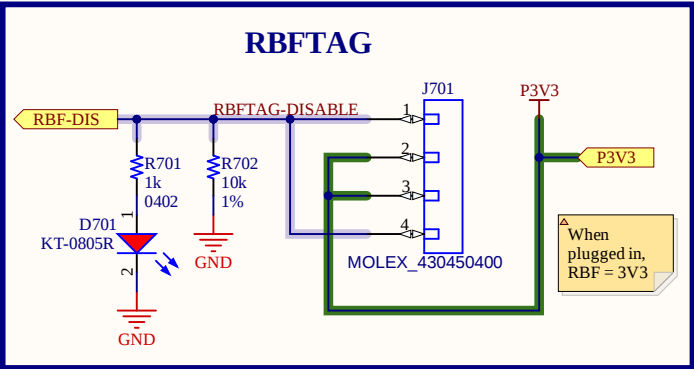


INPUT CONNECTORS

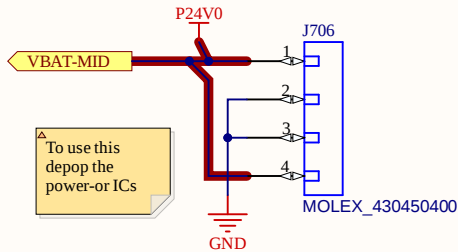
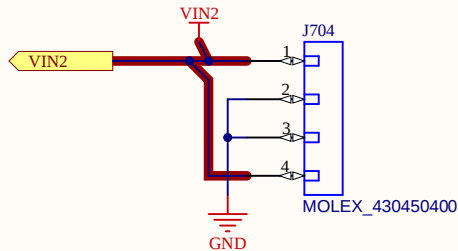
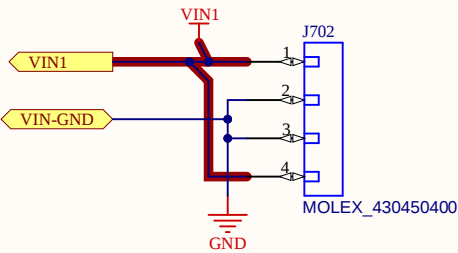
- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

Changes from last rev

- 2 power connectors w/ 48V
- new RBF connector
- FC connector pinout changed to match FC
- VBAT-MID conn to be compatible w/ old BMS



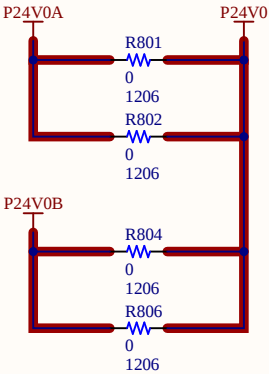
BATTERY MANAGEMENT SYSTEM



POWER

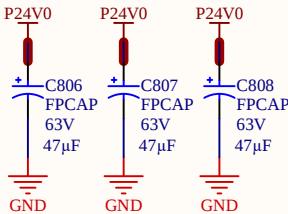
- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

If the power or doesn't work, populate one set of these

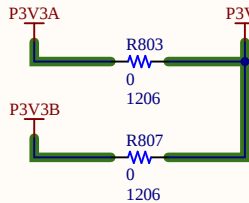


DNP  
R801,  
R802,  
R804,  
R806

Place these bulk caps near recovery drivers to support high load step



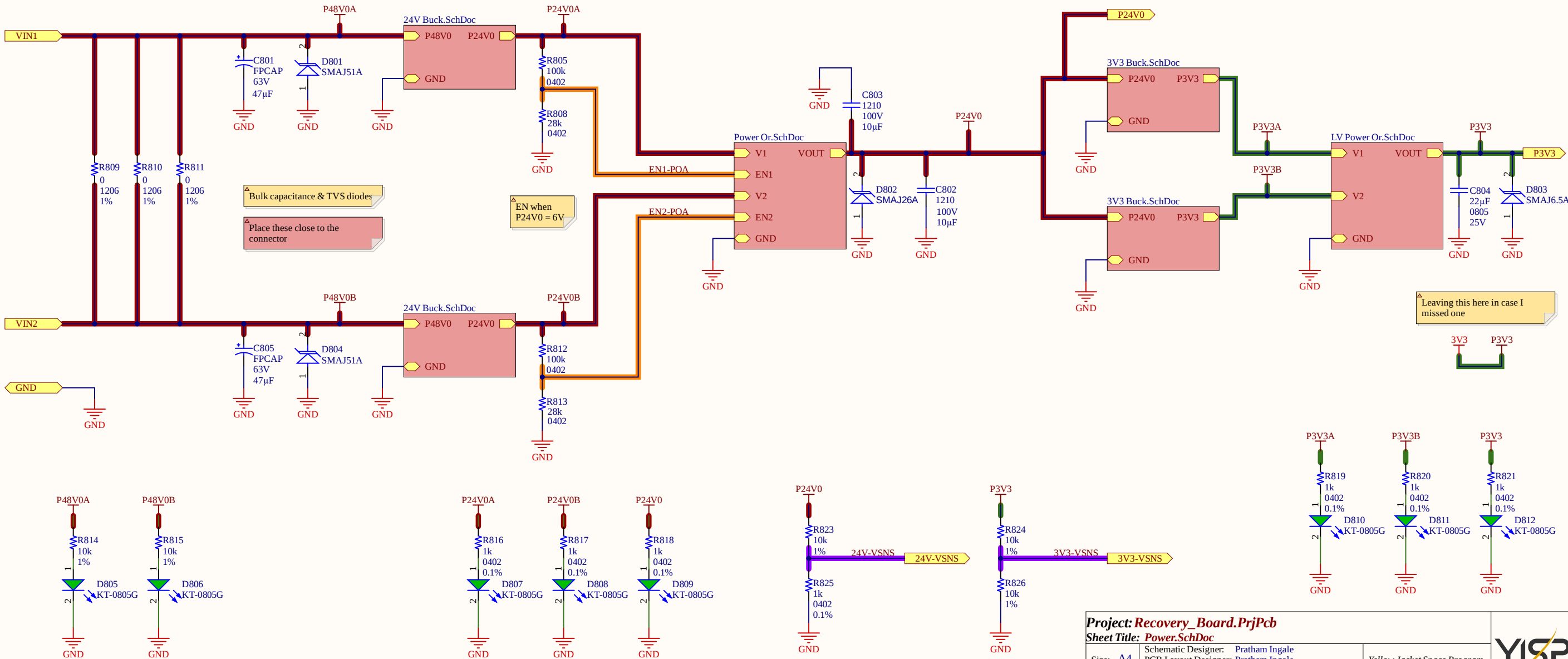
If the power or doesn't work, populate one of these



DNP  
R803,  
R807

Populate the 3 0R jumpers by default to combine the 48V nets. If issues are found with load switch logic, depopulate to isolate 48V inputs.

Changes from last rev  
- added 48V to 24V buck  
- added 2nd 24V to 3.3V buck  
- added both power or circuits



Bulk capacitance & TVS diodes  
Place these close to the connector

EN when  
P24V0 = 6V

Leaving this here in case I missed one

Project: Recovery\_Board.PrjPcb

Sheet Title: Power.SchDoc

Size: A4  
Schematic Designer: Pratham Ingale  
PCB Layout Designer: Pratham Ingale  
Responsible Engineer: Pratham Ingale

Date: 7/22/2026 Revision: 5.0 Sheet: 4 of: 13

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Atlanta, GA



24V BUCK CONVERTER

Informational Notes

Layout Notes

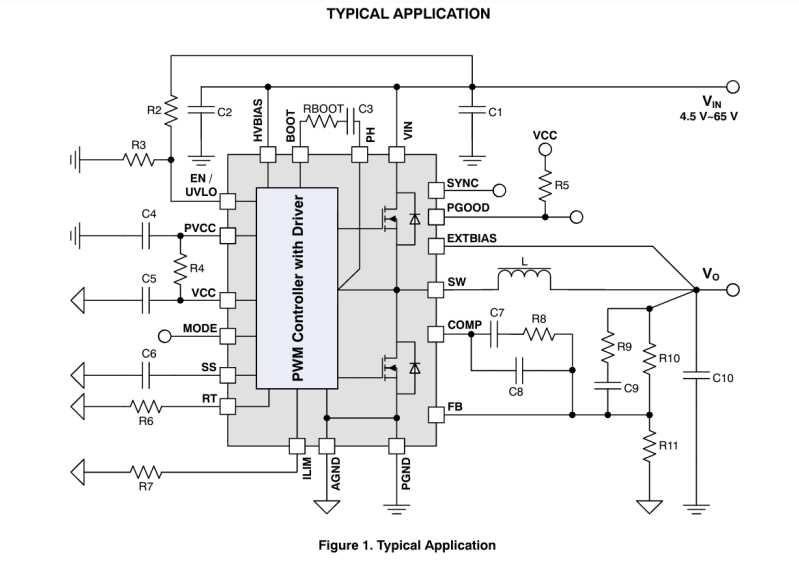
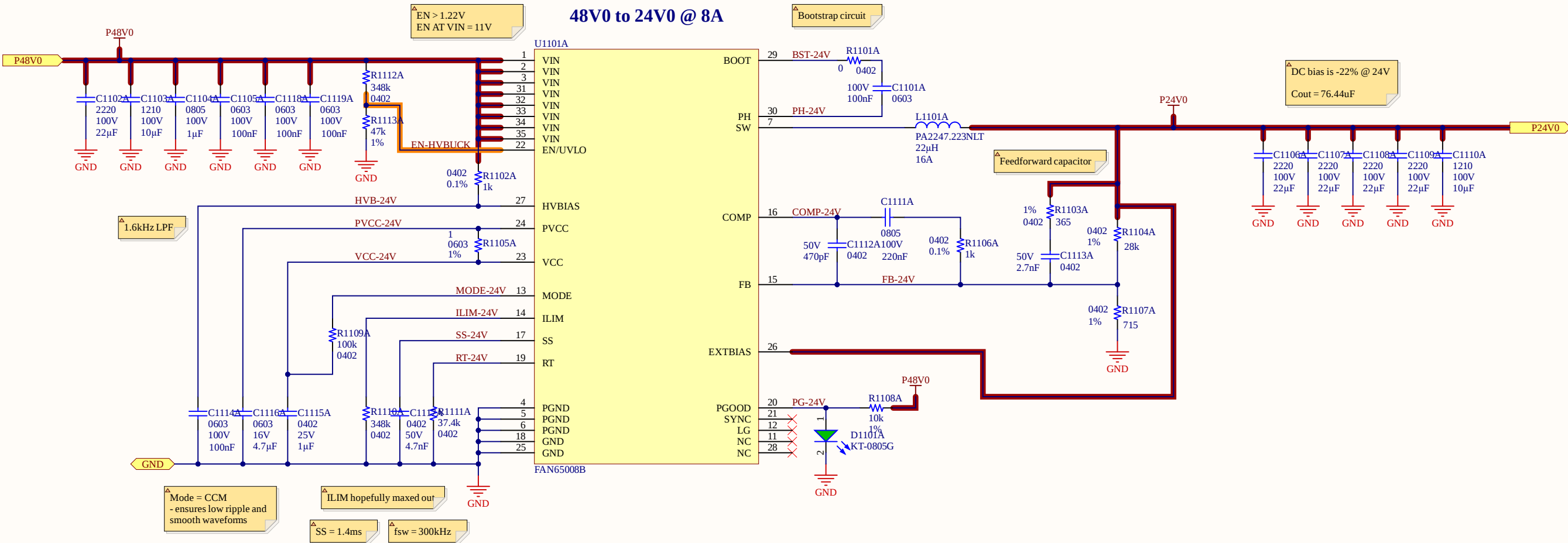
Software Notes

Assembly Notes

Todo Items

Design calculations can be found in 05\_Avionics\Projects\Recovery\Documentation\Buck\_Converter\_Calculations.xlsx

Changes from last rev - new page



| V <sub>IN</sub> (V) | V <sub>O</sub> (V) | L (μH) | L to be used (μH) | C <sub>O</sub> from V <sub>O</sub> RIPPLE (μF) | C <sub>O</sub> from V <sub>OS</sub> (μF) | C <sub>O</sub> from V <sub>US</sub> (μF) | C <sub>O</sub> to be used | R <sub>10</sub> (Ω) | R <sub>11</sub> (Ω) | R <sub>9</sub> (Ω) | R <sub>8</sub> (Ω) | C <sub>9</sub> (F) | C <sub>7</sub> (F) | C <sub>8</sub> (F) | f <sub>CO</sub> (Hz) | Phase margin (°) | R <sub>T</sub> (=R6) (Ω) |
|---------------------|--------------------|--------|-------------------|------------------------------------------------|------------------------------------------|------------------------------------------|---------------------------|---------------------|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|------------------|--------------------------|
| 48                  | 24                 | 26.667 |                   | 2.6                                            | 30.9                                     | 30.9                                     |                           |                     | 718.2               |                    |                    |                    |                    |                    |                      |                  |                          |
| 48                  | 28                 | 25.926 | 22.00             | 2.2                                            | 22.7                                     | 31.4                                     | 75.2                      | 28010               | 613.4               | 365                | 1.0k               | 2.7n               | 220n               | 470p               |                      |                  | 3.75E+04                 |

Project: Recovery\_Board.PrjPcb  
Sheet Title: 24V Buck.SchDoc

Size: A4  
Schematic Designer: Pratham Ingale  
PCB Layout Designer: Pratham Ingale  
Responsible Engineer: Pratham Ingale

Date: 7/22/2026 Revision: 5.0 Sheet: 5 of: 13

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24V BUCK CONVERTER

Informational Notes

Layout Notes

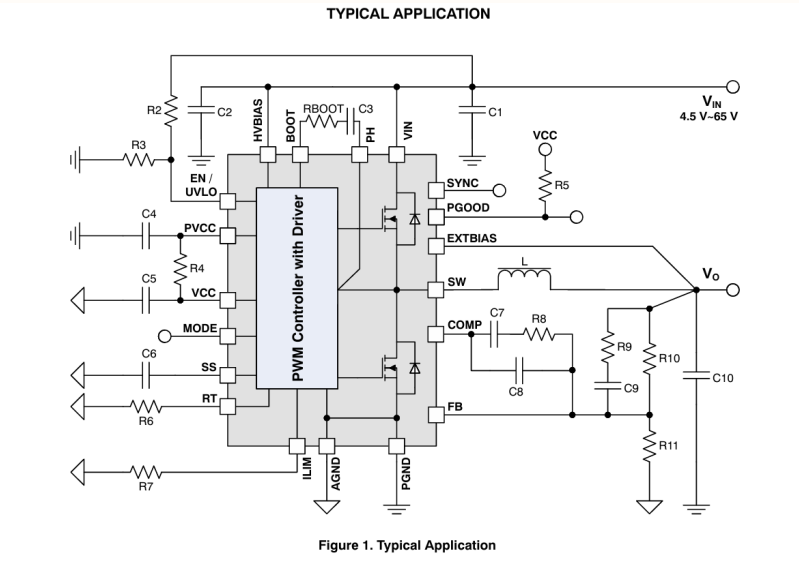
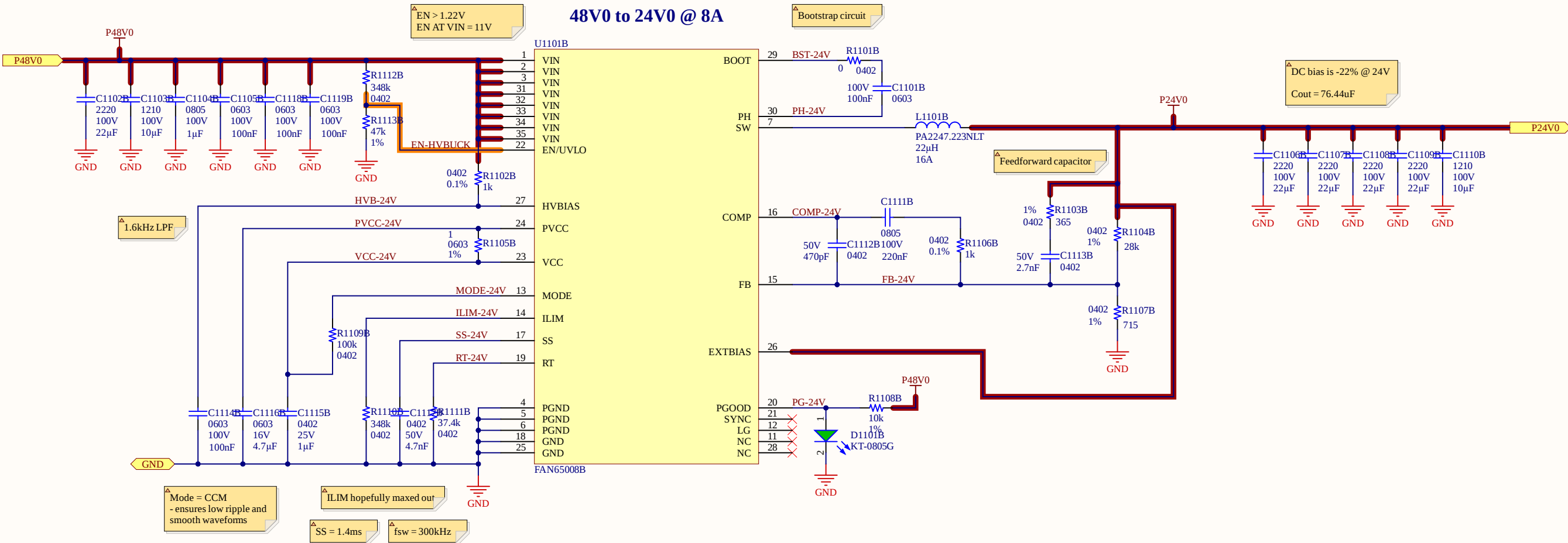
Software Notes

Assembly Notes

Todo Items

Design calculations can be found in 05\_Avionics\Projects\Recovery\Documentation\Buck\_Converter\_Calculations.xlsx

Changes from last rev - new page



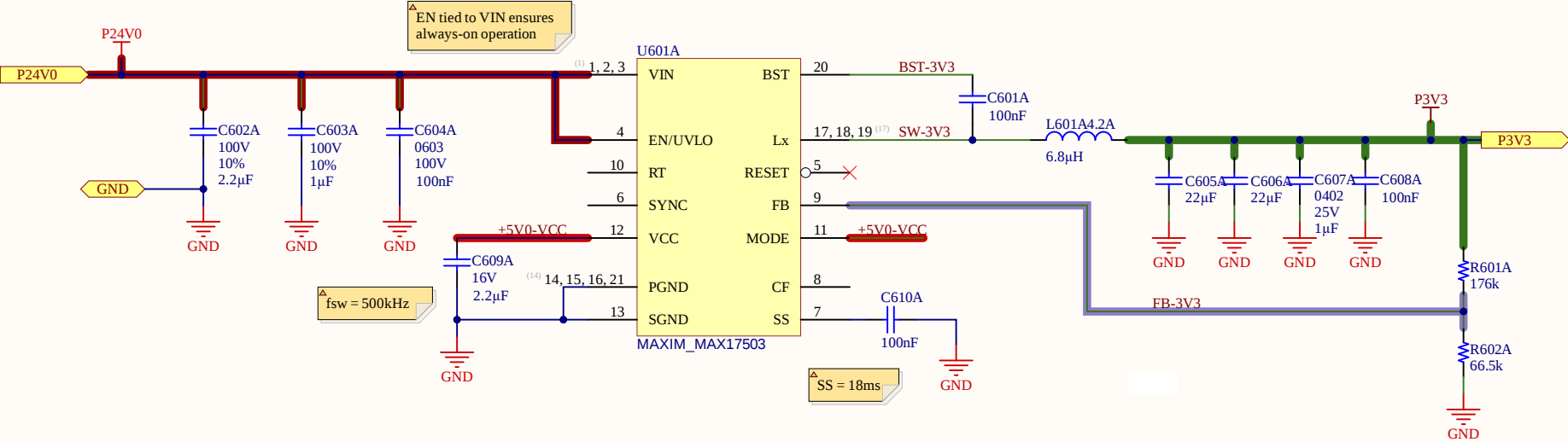
3V3 BUCK CONVERTER

- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

Changes from last rev  
- EN tied to VIN for always-on operation

Design calculations can be found in  
05\_Avionics\Projects\Recovery\Documen  
tion\Buck\_Converter\_Calculations.xlsx

24V0 to 3V3



|                                |                                                                                                                    |                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Project: Recovery_Board.PrjPcb |                                                                                                                    |                                                            |
| Sheet Title: 3V3 Buck.SchDoc   |                                                                                                                    |                                                            |
| Size: A4                       | Schematic Designer: Madhawi Alharbi<br>PCB Layout Designer: Pratham Ingale<br>Responsible Engineer: Pratham Ingale | Yellow Jacket Space Program<br>Georgia Tech<br>Atlanta, GA |
| Date: 7/22/2026                | Revision: 5.0                                                                                                      | Sheet: 6 of 13                                             |



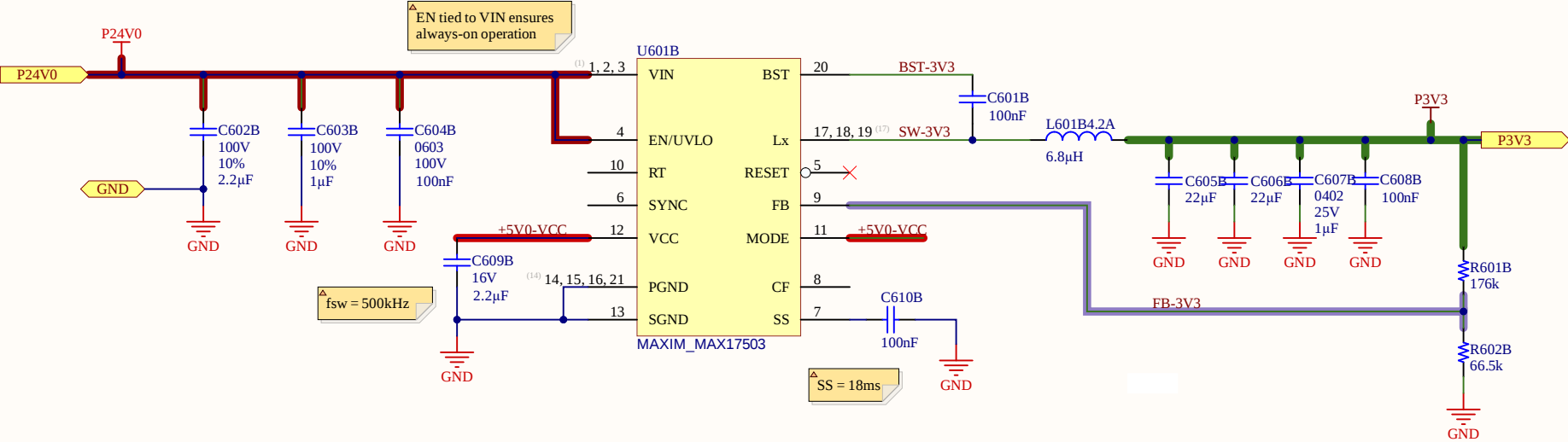
3V3 BUCK CONVERTER

- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

Changes from last rev  
- EN tied to VIN for always-on operation

Design calculations can be found in  
05\_Avionics\Projects\Recovery\Documen  
tion\Buck\_Converter\_Calculations.xlsx

24V0 to 3V3



|                                |                                                                                                                    |                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Project: Recovery_Board.PrjPcb |                                                                                                                    |                                                            |
| Sheet Title: 3V3 Buck.SchDoc   |                                                                                                                    |                                                            |
| Size: A4                       | Schematic Designer: Madhawi Alharbi<br>PCB Layout Designer: Pratham Ingale<br>Responsible Engineer: Pratham Ingale | Yellow Jacket Space Program<br>Georgia Tech<br>Atlanta, GA |
| Date: 7/22/2026                | Revision: 5.0                                                                                                      | Sheet: 6 of 13                                             |



**POWER OR**

Informational Notes

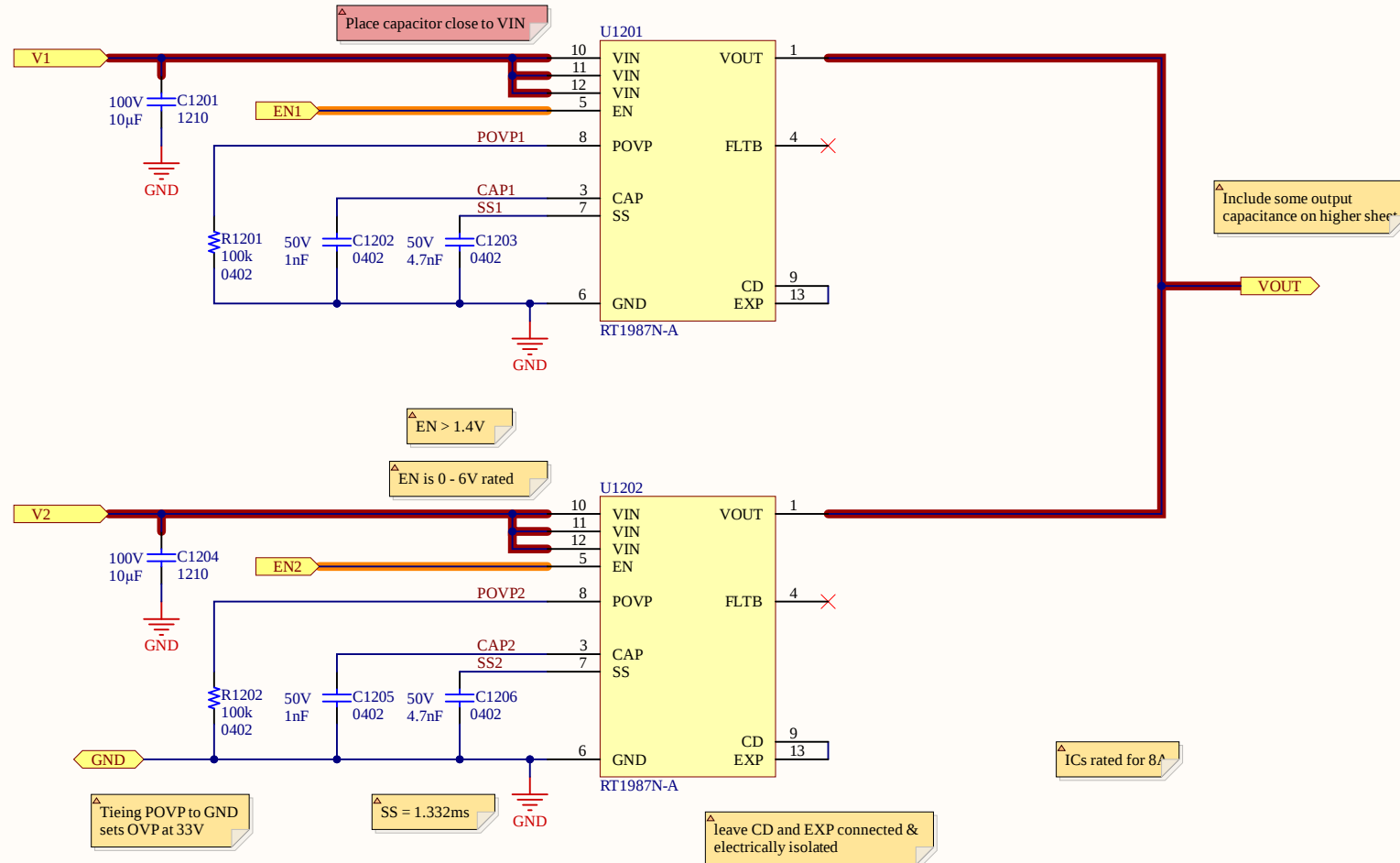
Layout Notes

Software  
Notes

## Assembly Notes

#### Todo Items

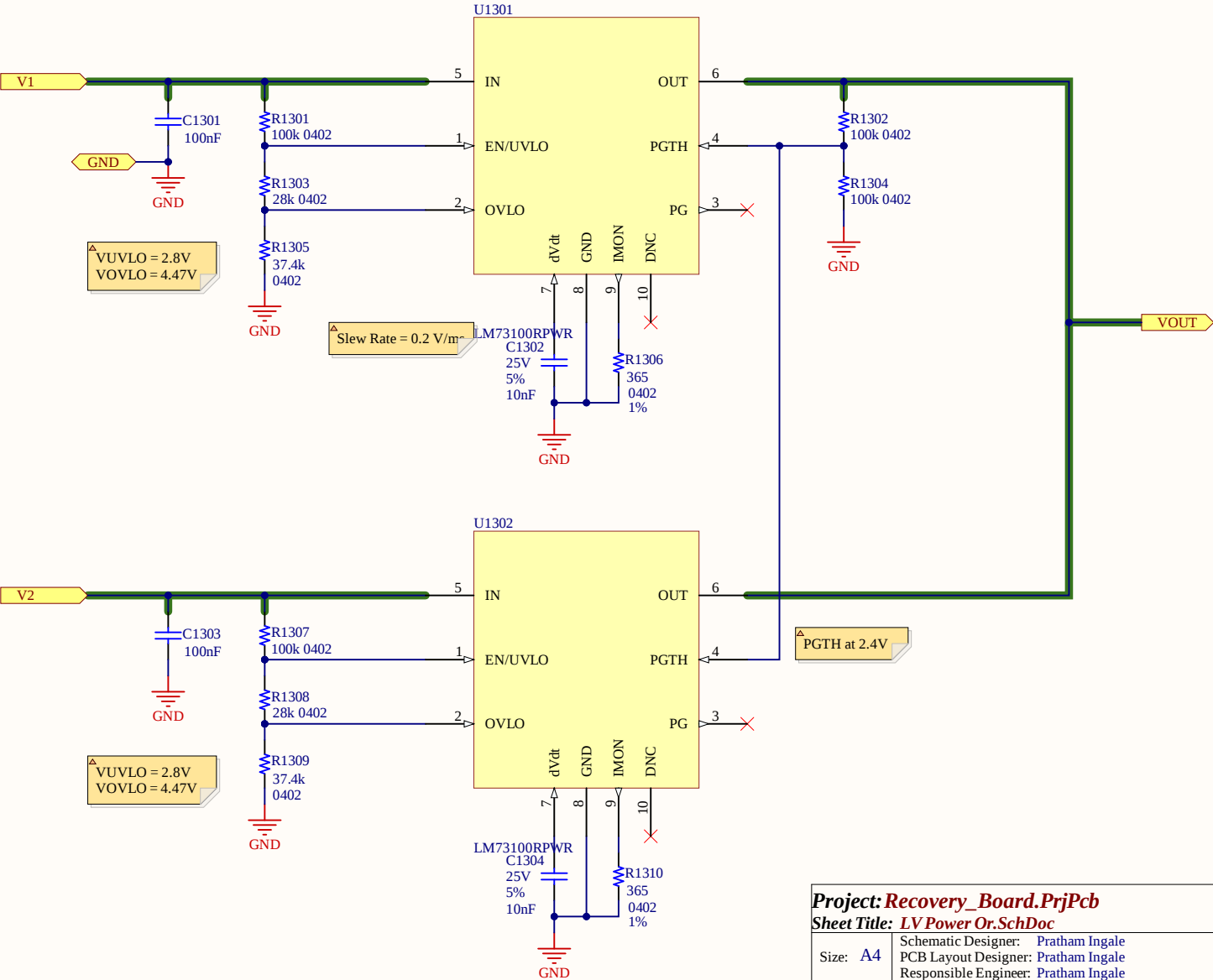
Changes from last rev  
- new page



LV POWER OR

- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

Changes from last rev  
- new page



Informational Notes

Software

## Todo Items

| A | B | C | Output |
|---|---|---|--------|
|---|---|---|--------|

Output =  $AB + BC + AC$   
Representing:  
A -> uC\_A  
B -> uC\_B  
C -> uC\_C



Sheet Title: **Voting\_Logic.SchDoc**

Size: A4

|                       |                 |
|-----------------------|-----------------|
| Schematic Designer:   | Madhawi Alharbi |
| PCB Layout Designer:  | Pratham Ingale  |
| Responsible Engineer: | Pratham Ingale  |

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Georgia Tech  
Atlanta, GA



Informational Notes

Software  
Notes

## Todo Items

| A | B | C | Output |
|---|---|---|--------|
| 0 | 0 | 0 | F      |
| 0 | 0 | 1 | F      |
| 0 | 1 | 0 | F      |
| 0 | 1 | 1 | T      |
| 1 | 0 | 0 | F      |
| 1 | 0 | 1 | T      |
| 1 | 1 | 0 | T      |
| 1 | 1 | 1 | T      |

Project: **Recovery\_Board.PrjPcb**Sheet Title: **Voting\_Logic.SchDoc**

|                 |                                                                                                                                         |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Size: <b>A4</b> | Schematic Designer: <b>Madhawi Alharbi</b><br>PCB Layout Designer: <b>Pratham Ingale</b><br>Responsible Engineer: <b>Pratham Ingale</b> |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|

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Georgia Tech  
Atlanta, GA*



MICROCONTROLLER

Informational Notes

Layout Notes

Software Notes

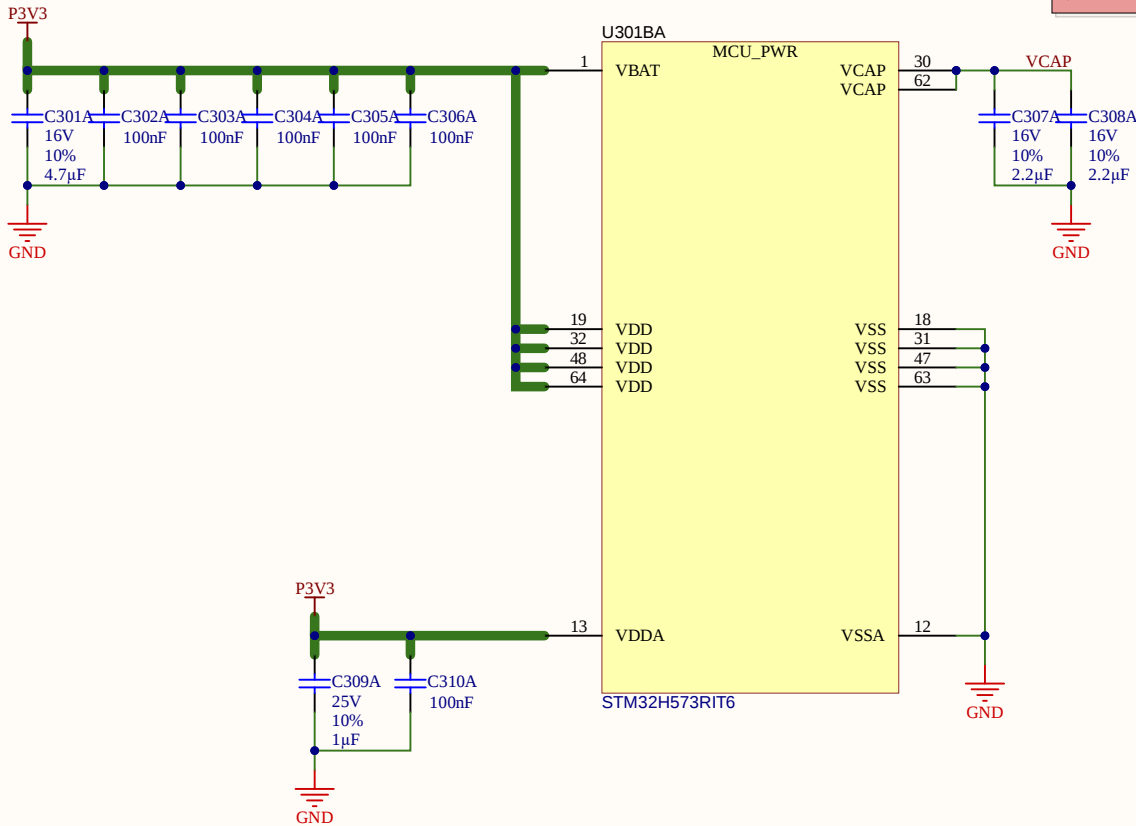
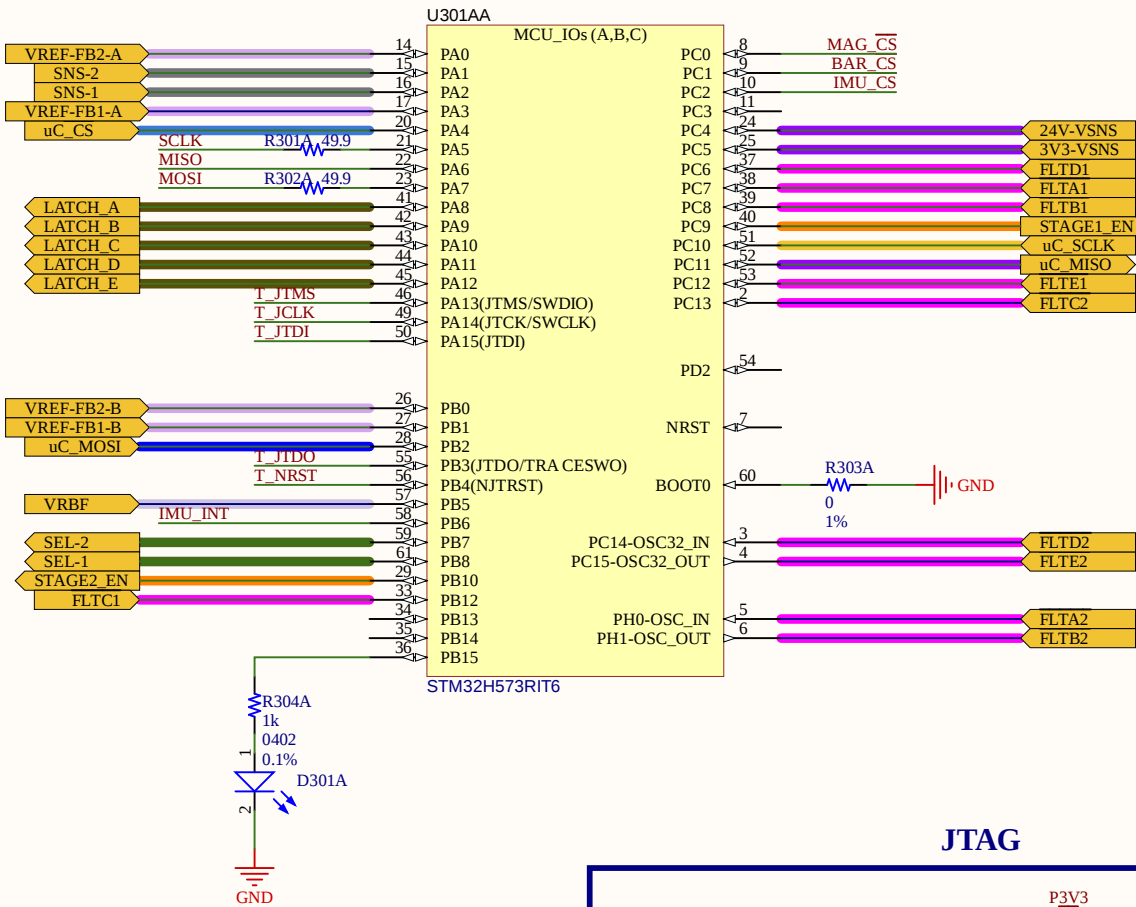
Assembly Notes

Todo Items

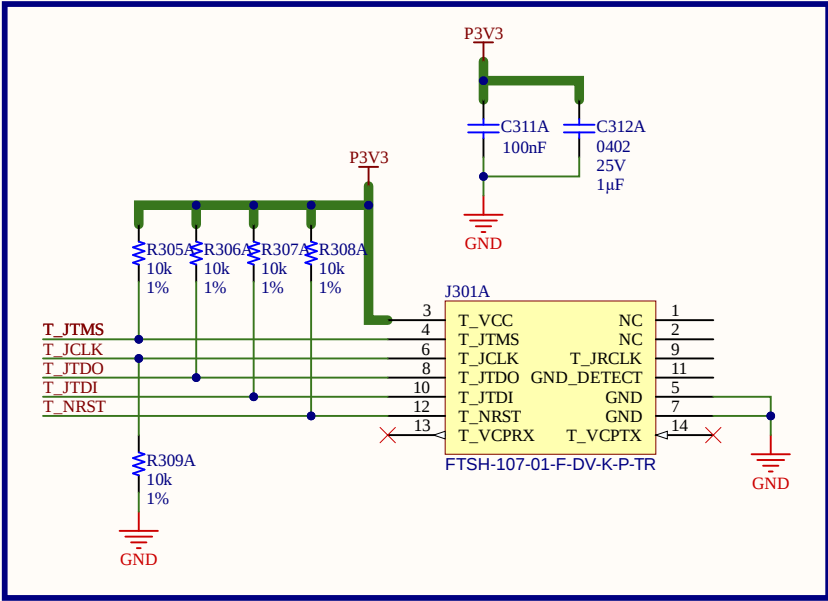
Changes from last rev  
- STM32 pinout

Place C310 and C309 to decouple VDDA

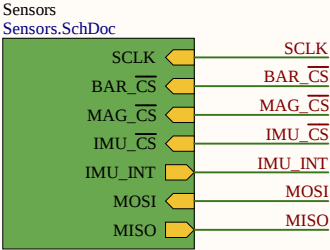
LATCH\_A  
LATCH\_B  
LATCH\_C  
LATCH\_D  
LATCH\_E  
must be configured as open-drain



JTAG



SENSORS



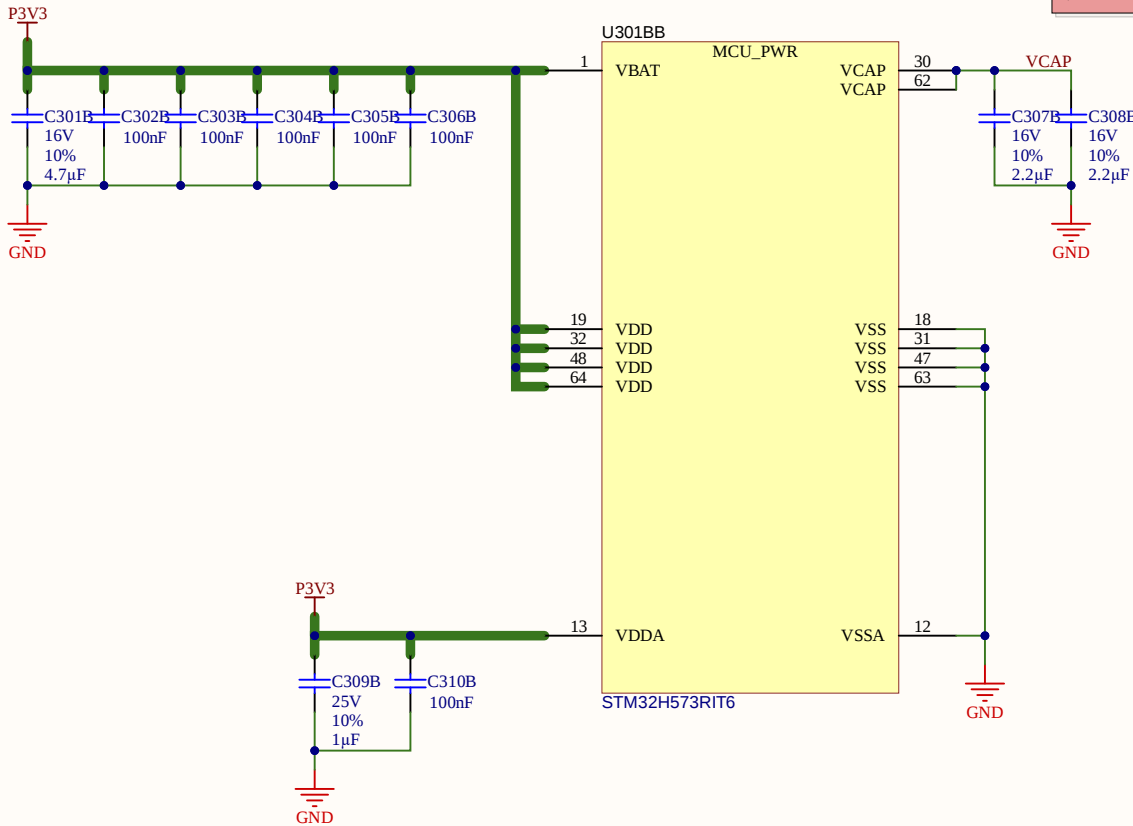
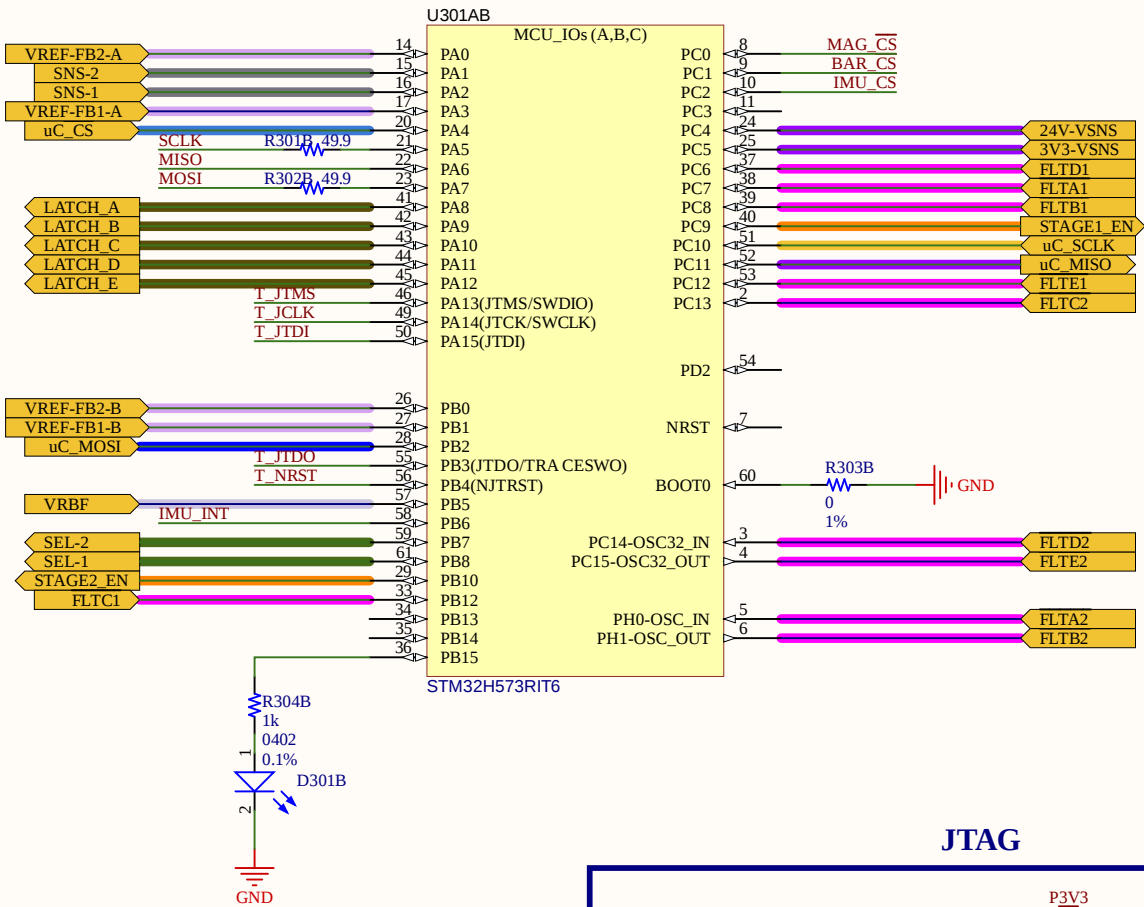
MICROCONTROLLER

- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

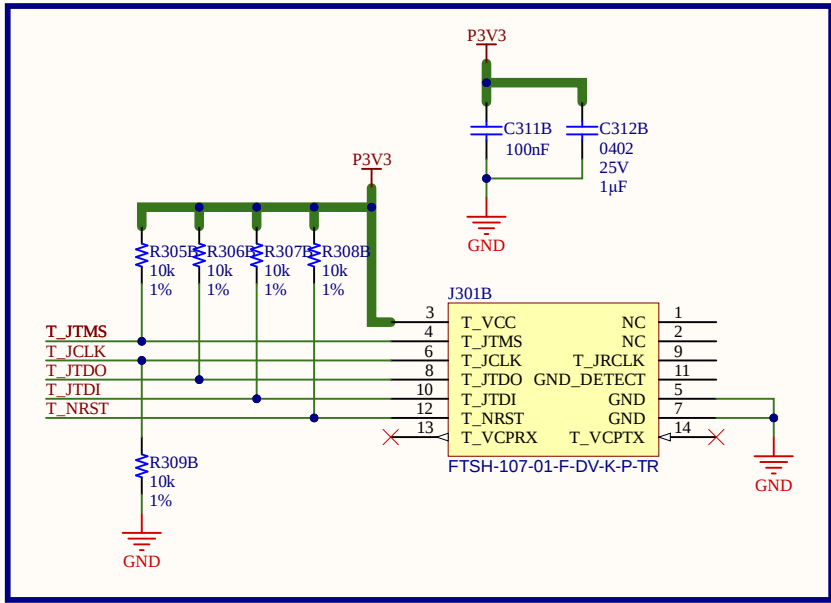
Changes from last rev  
- STM32 pinout

Place C310 and C309 to decouple VDDA

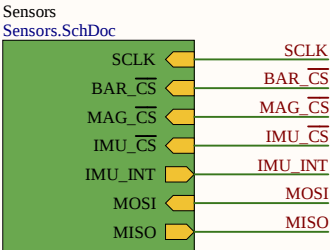
LATCH\_A  
LATCH\_B  
LATCH\_C  
LATCH\_D  
LATCH\_E  
must be configured as open-drain



JTAG



SENSORS



|                                            |                                                                                                                                         |                  |               |                                                            |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|------------------------------------------------------------|
| Project: <b>Recovery_Board.PrjPcb</b>      |                                                                                                                                         |                  |               |                                                            |
| Sheet Title: <b>Microcontroller.SchDoc</b> |                                                                                                                                         |                  |               |                                                            |
| Size: <b>A4</b>                            | Schematic Designer: <b>Madhawi Alharbi</b><br>PCB Layout Designer: <b>Pratham Ingale</b><br>Responsible Engineer: <b>Pratham Ingale</b> |                  |               | Yellow Jacket Space Program<br>Georgia Tech<br>Atlanta, GA |
| Date: <b>7/22/2026</b>                     | Revision: <b>5.0</b>                                                                                                                    | Sheet: <b>10</b> | of: <b>13</b> |                                                            |

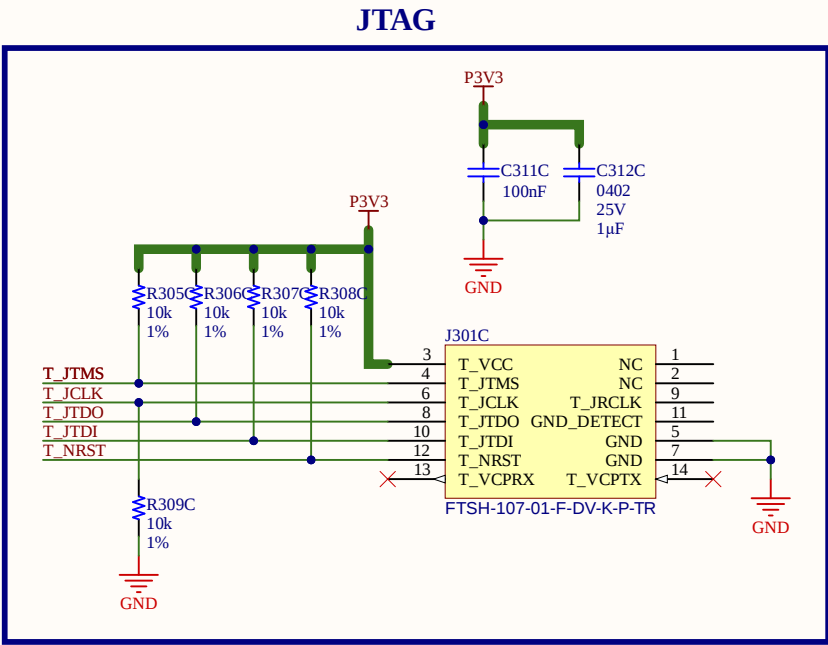
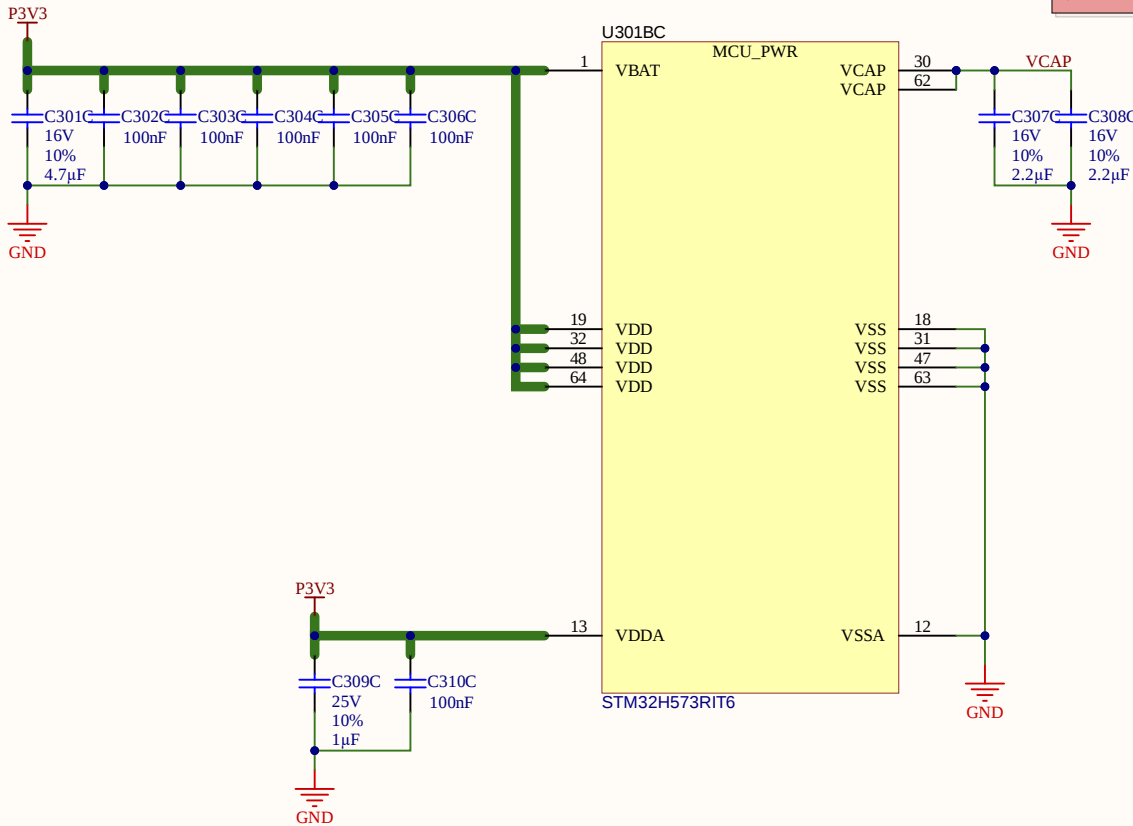
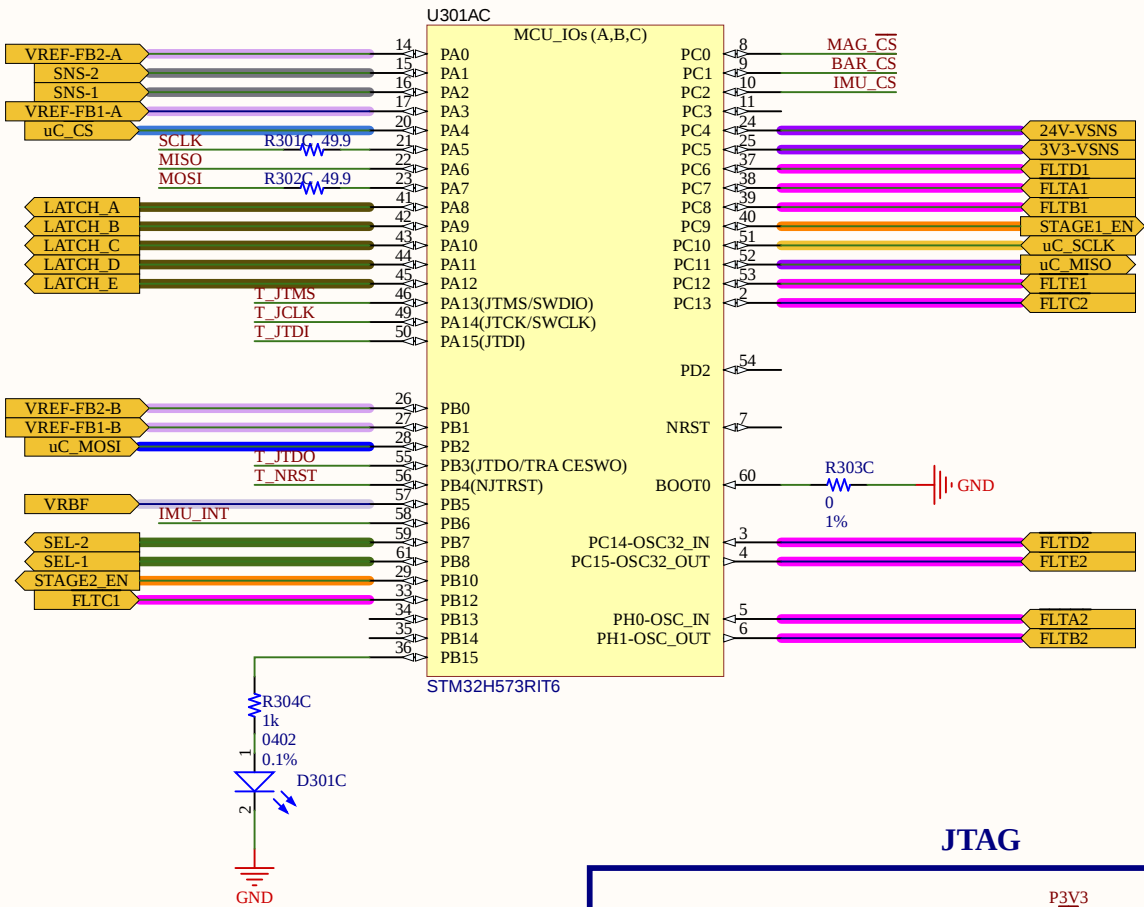
MICROCONTROLLER

- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

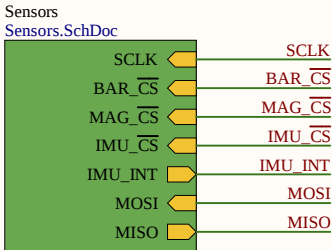
Changes from last rev  
- STM32 pinout

Place C310 and C309 to decouple VDDA

LATCH\_A  
LATCH\_B  
LATCH\_C  
LATCH\_D  
LATCH\_E  
must be configured as open-drain



SENSORS



SENSORS

Informational Notes

Layout Notes

Software Notes

Assembly Notes

Todo Items

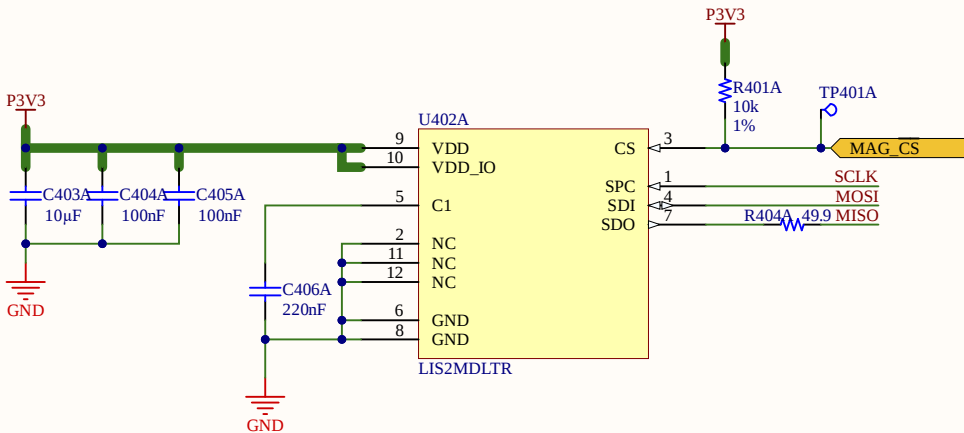
SCLKSCLK

MISOMISO

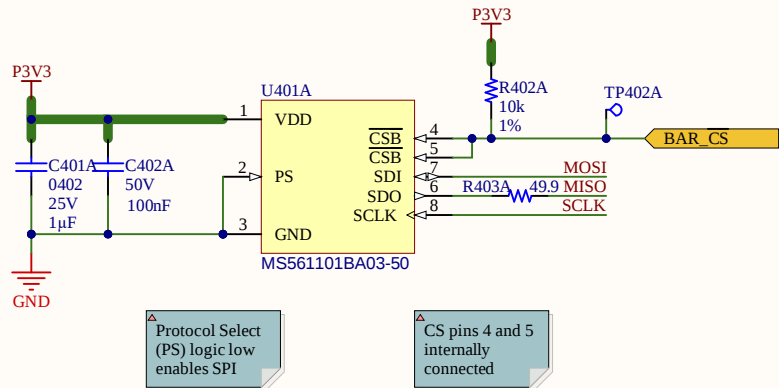
MOSIMOSI

Changes from last rev  
- nothing

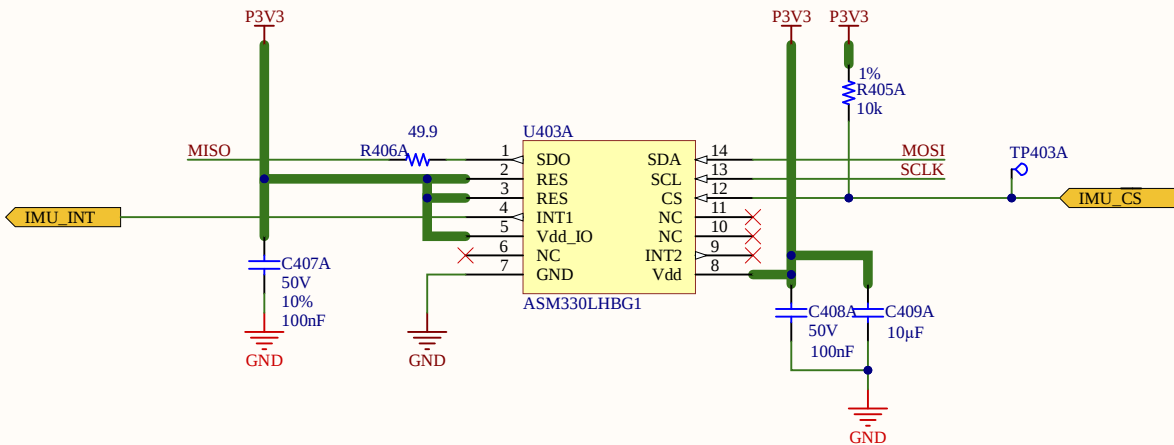
MAGNETOMETER



BAROMETER AND THERMOMETER



INERTIAL MEASUREMENT UNIT



Project: Recovery\_Board.PrjPcb

Sheet Title: Sensors.SchDoc

Size: A4

Schematic Designer: Madhawi Alharbi

PCB Layout Designer: Pratham Ingale

Responsible Engineer: Pratham Ingale

Date: 7/22/2026

Revision: 5.0

Sheet: 11 of 13

Yellow Jacket Space Program

Georgia Tech

Atlanta, GA

SENSORS

Informational Notes

Layout Notes

Software Notes

Assembly Notes

Todo Items

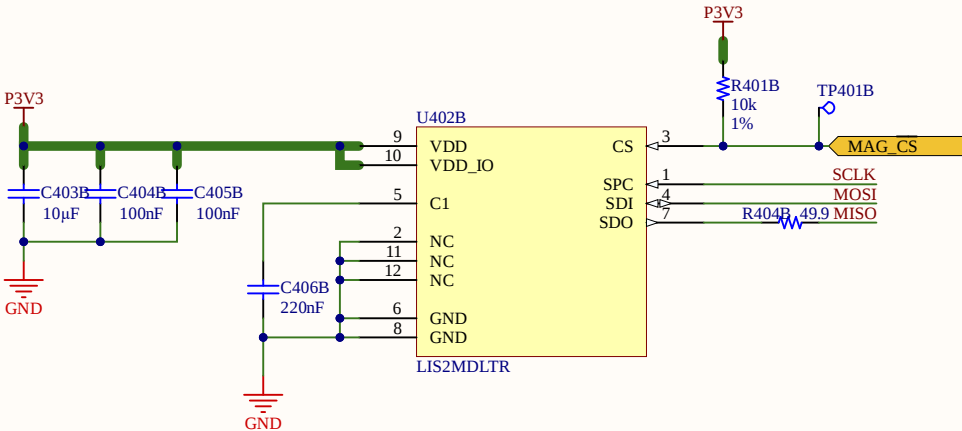
SCLKSCLK

MISOMISO

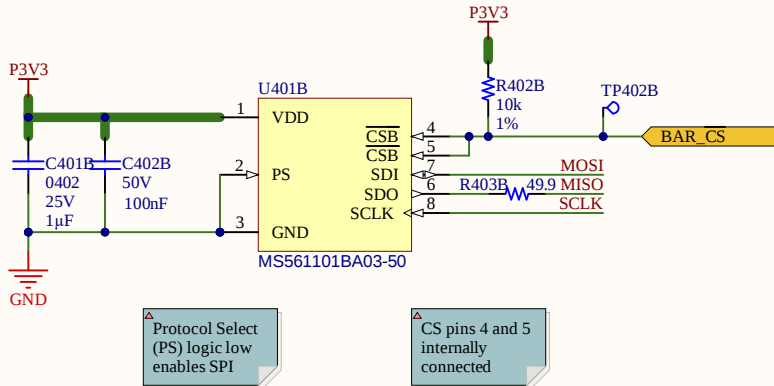
MOSIMOSI

Changes from last rev  
- nothing

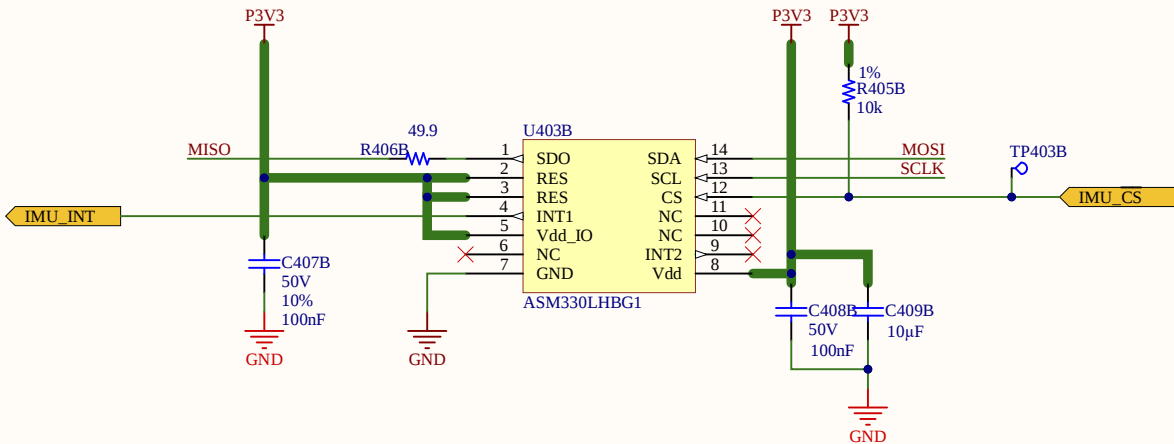
MAGNETOMETER



BAROMETER AND THERMOMETER



INERTIAL MEASUREMENT UNIT



Project: Recovery\_Board.PrjPcb

Sheet Title: Sensors.SchDoc

Size: A4  
Schematic Designer: Madhawi Alharbi  
PCB Layout Designer: Pratham Ingale  
Responsible Engineer: Pratham Ingale

Date: 7/22/2026 Revision: 5.0 Sheet: 11 of: 13

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## SENSORS

Inform  
Notes

Layout Notes

Software  
Notes

Assembly  
Notes

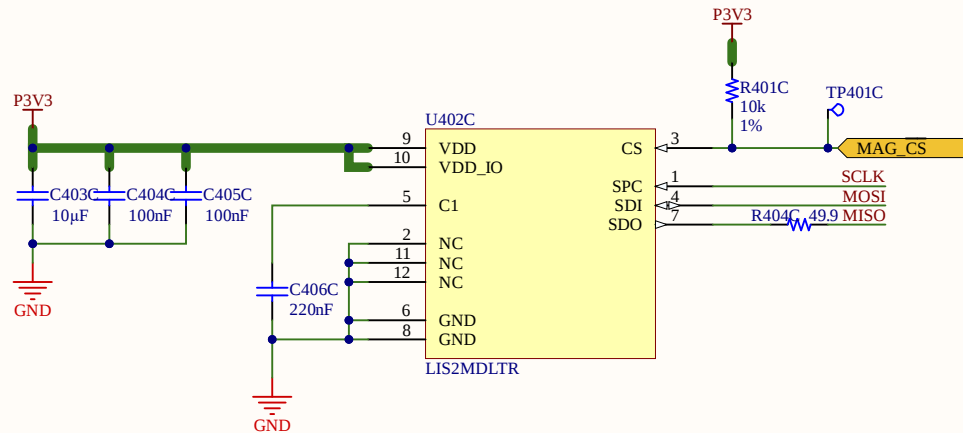
#### Todo Items

Diagram showing the signal lines for SPI:

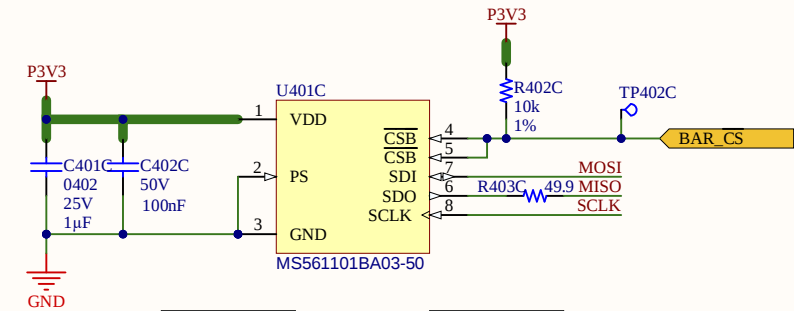
- SCLK (Serial Clock)
- MISO (Master In Slave Out)
- MOSI (Master Out Slave In)

Changes from last rev  
- nothing

## MAGNETOMETER



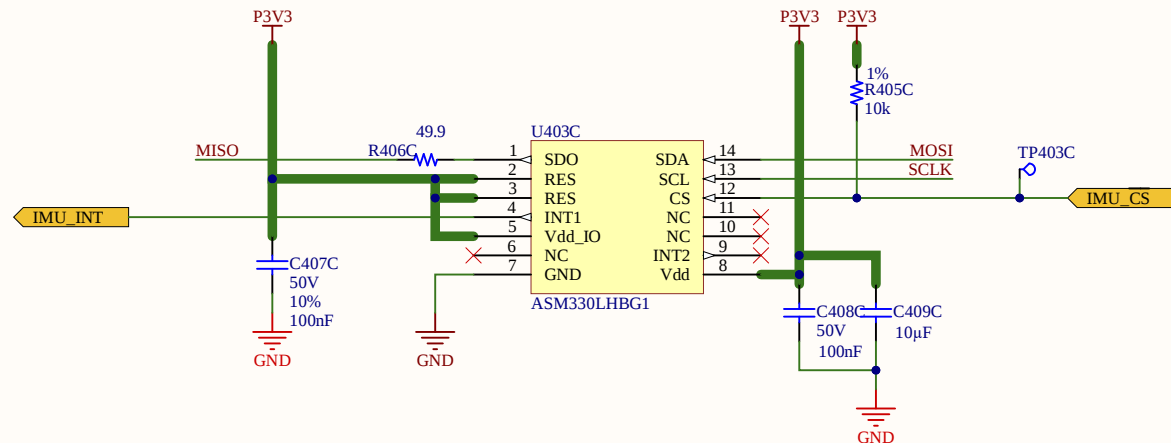
## BAROMETER AND THERMOMETER



Protocol Select (PS) logic low enables SPI

CS pins 4 and 5 internally connected

## INERTIAL MEASUREMENT UNIT

Project: **Recovery\_Board.PrjPcb**

Sheet Title: **Sensors.SchDoc**

|          |                                                                                                                    |
|----------|--------------------------------------------------------------------------------------------------------------------|
| Size: A4 | Schematic Designer: Madhawi Alharbi<br>PCB Layout Designer: Pratham Ingale<br>Responsible Engineer: Pratham Ingale |
|----------|--------------------------------------------------------------------------------------------------------------------|

*Yellow Jacket Space Program  
Georgia Tech  
Atlanta, GA*



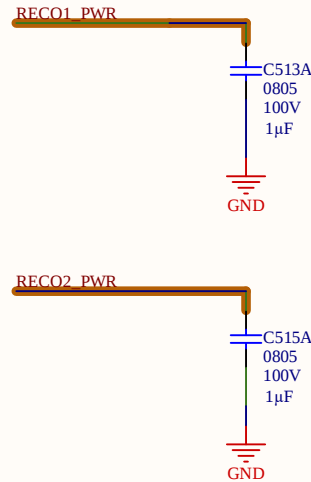
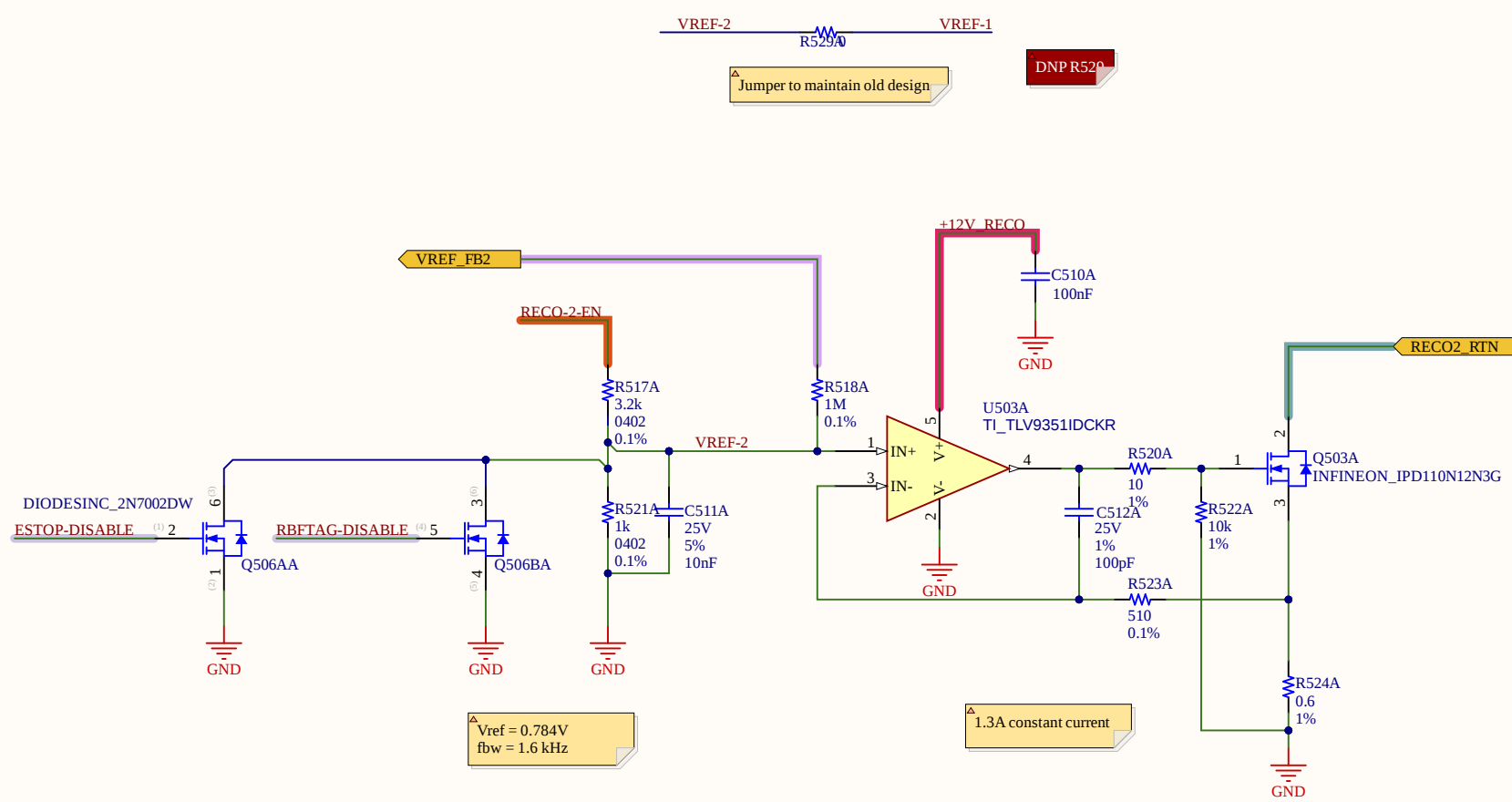
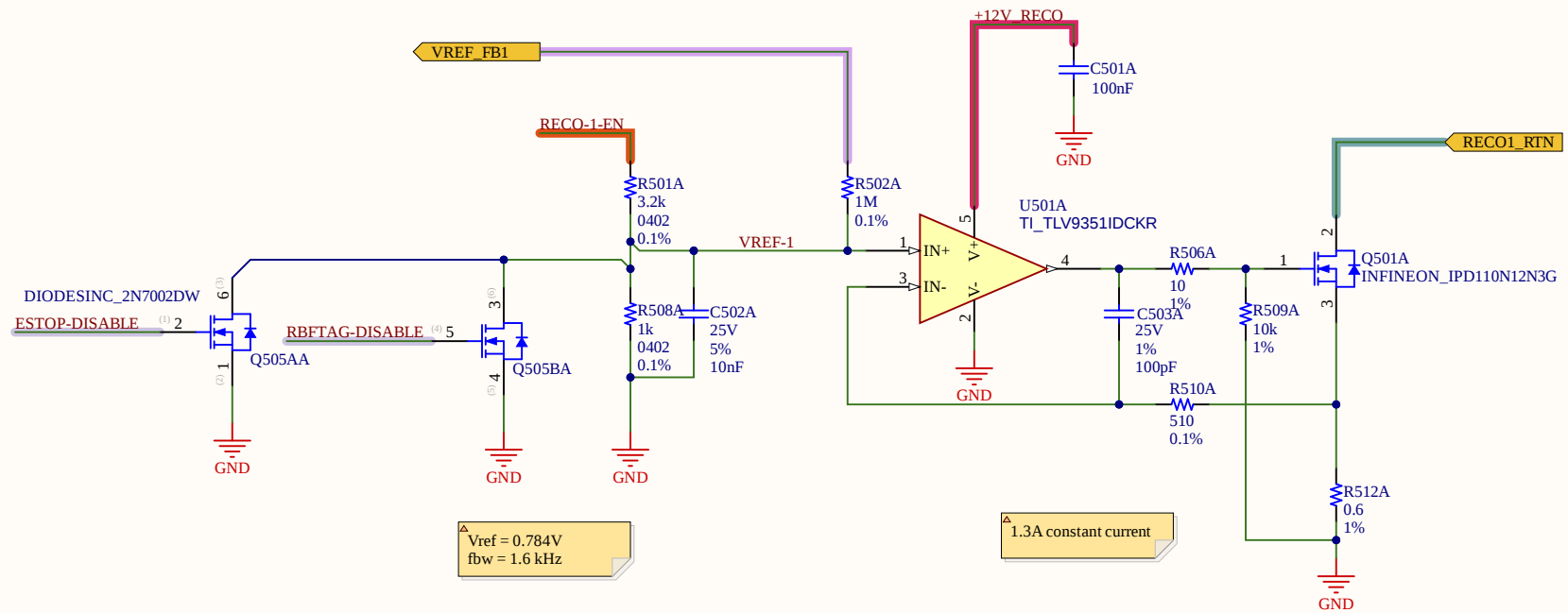
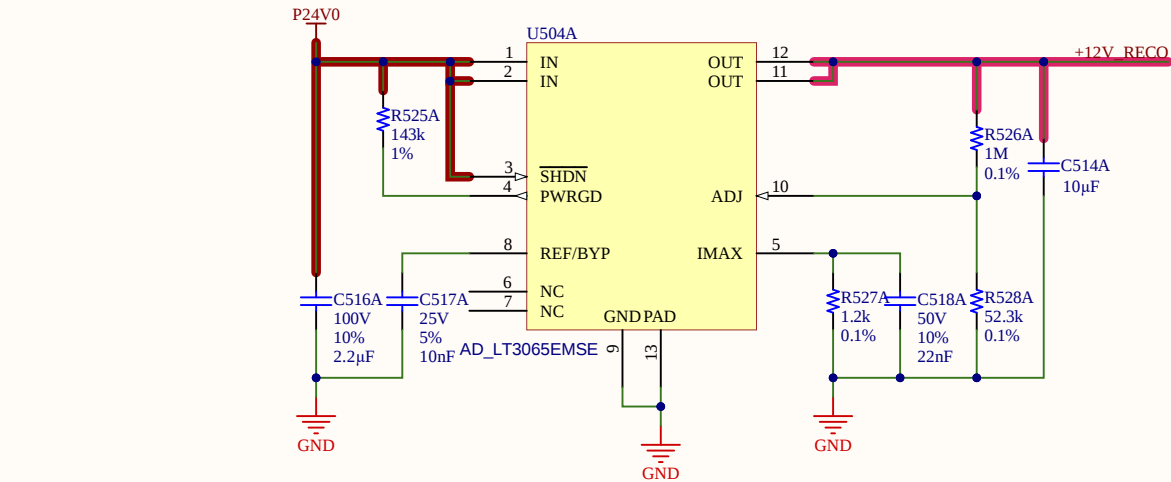
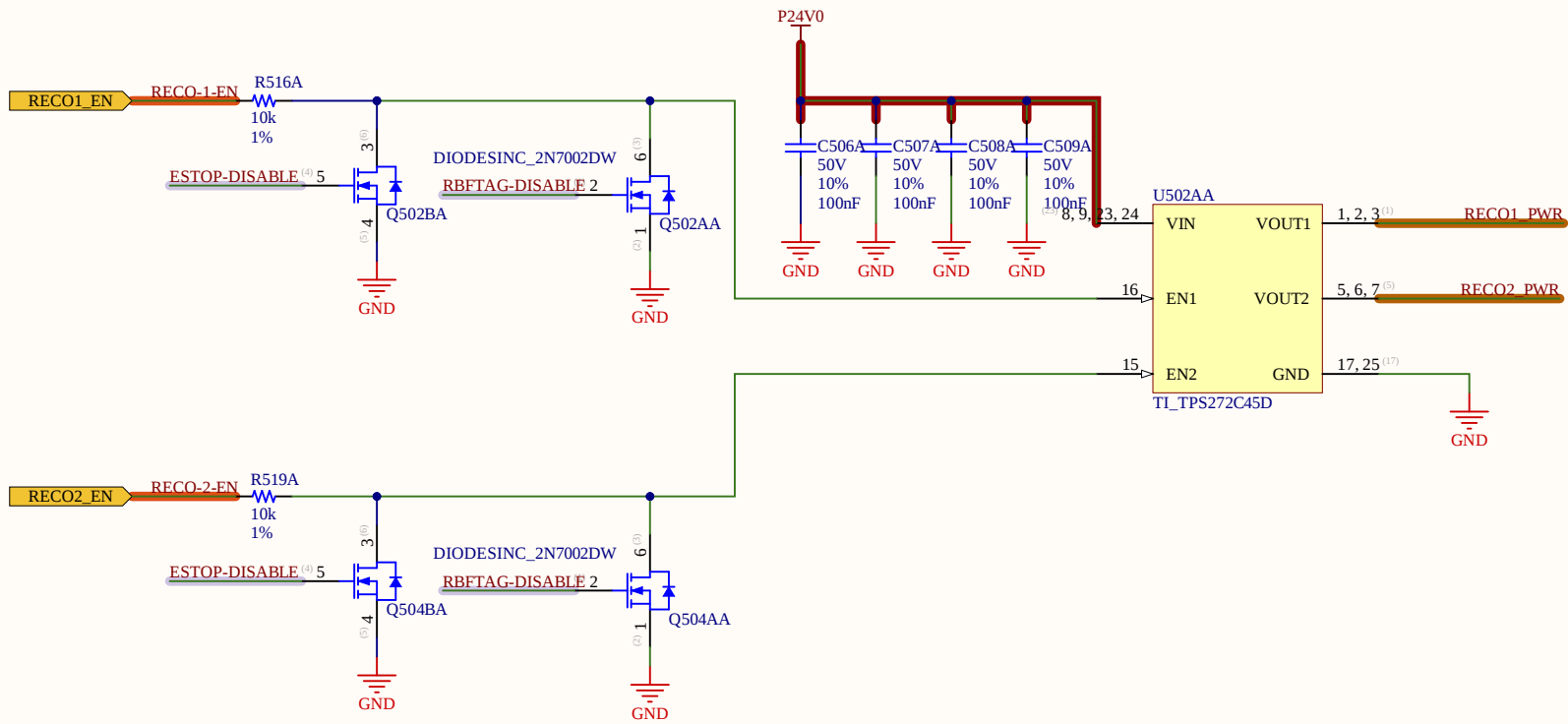
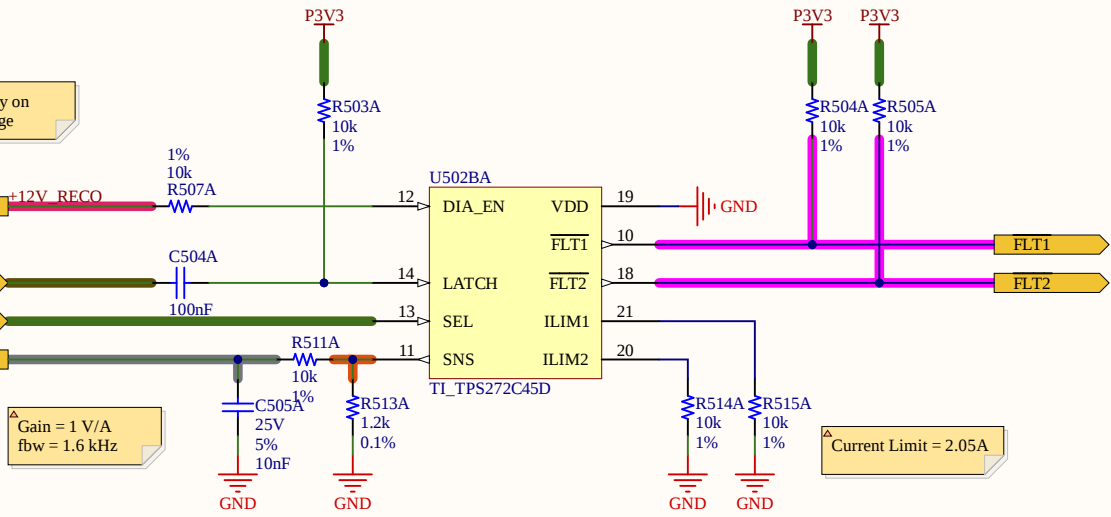
RECOVERY DRIVERS

- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

Changes from last rev  
- changed from version C of IC to version D for 2x  
fault pins

- RECO1\_PWR
- RECO1\_PWR
- RECO2\_PWR
- RECO2\_PWR
- RBFTAG\_DISABLE
- RBFTAG\_DISABLE
- ESTOP\_DISABLE
- ESTOP\_DISABLE

Latch retry on  
falling edge



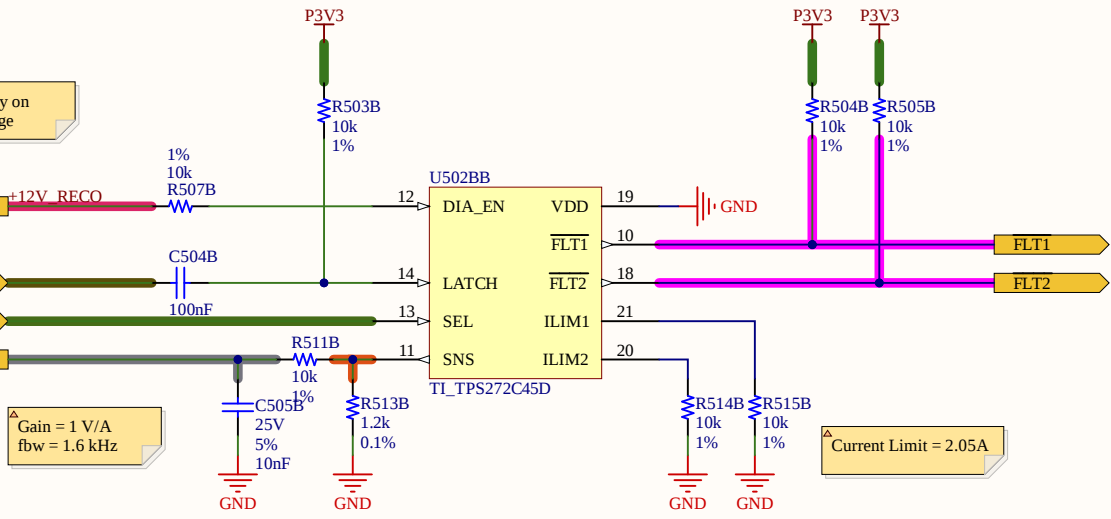
RECOVERY DRIVERS

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- Software Notes
- Assembly Notes
- Todo Items

Changes from last rev  
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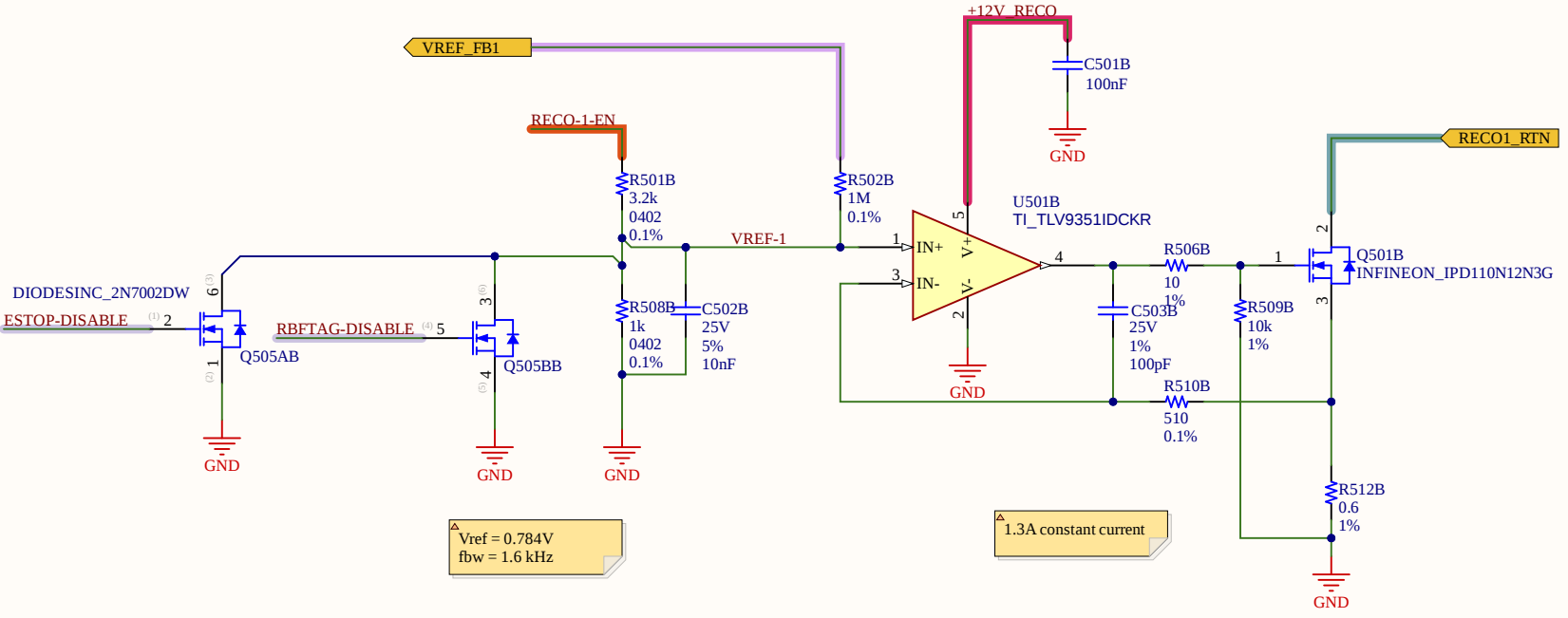
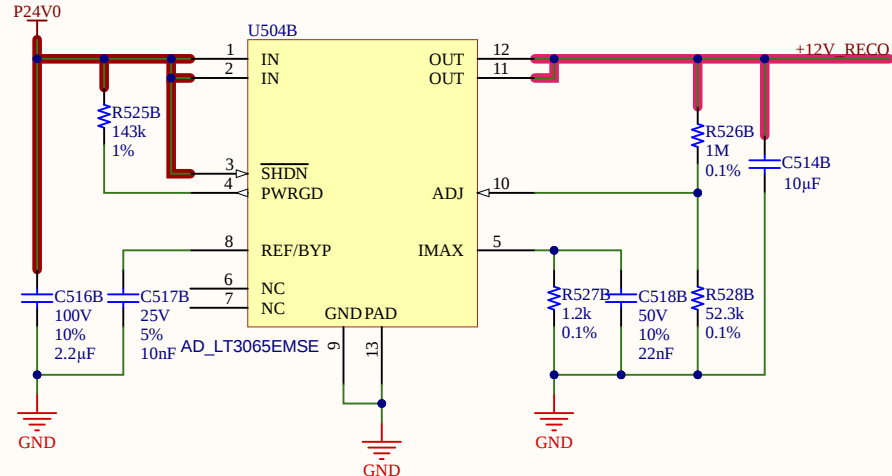
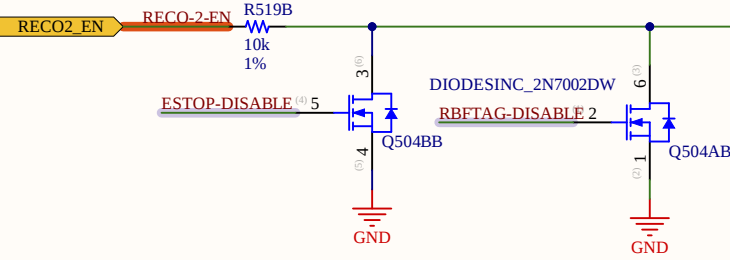
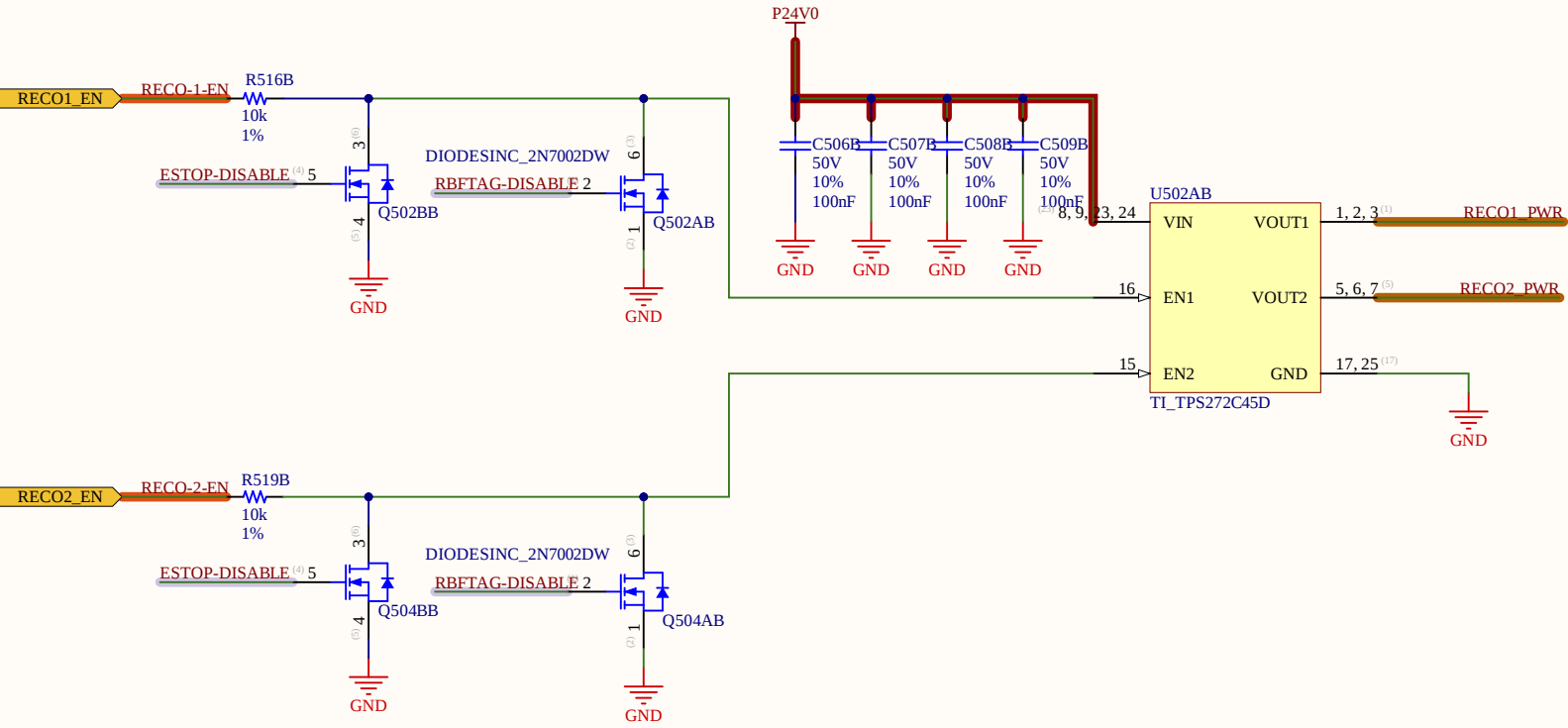
- RECO1\_PWR
- RECO1\_PWR
- RECO2\_PWR
- RECO2\_PWR
- RBFTAG\_DISABLE
- RBFTAG\_DISABLE
- ESTOP\_DISABLE
- ESTOP\_DISABLE

Latch retry on falling edge



Gain = 1 V/A  
fbw = 1.6 kHz

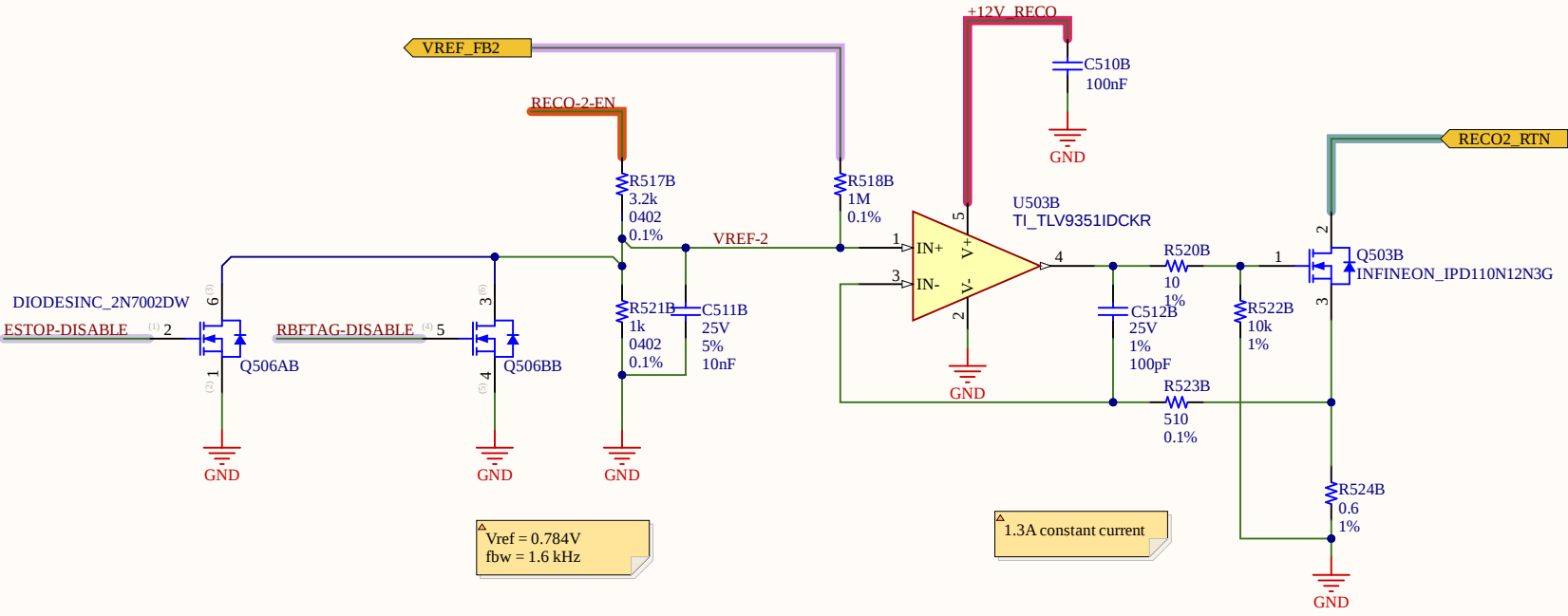
Current Limit = 2.05A



Vref = 0.784V  
fbw = 1.6 kHz

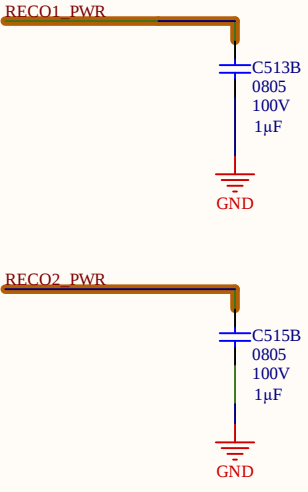
1.3A constant current

Jumper to maintain old design

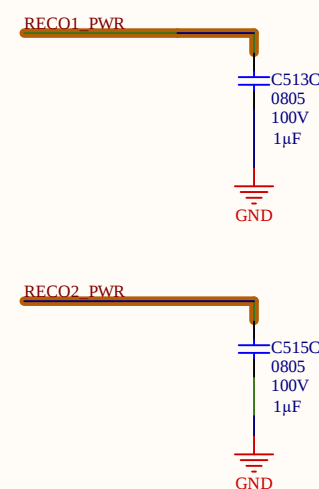
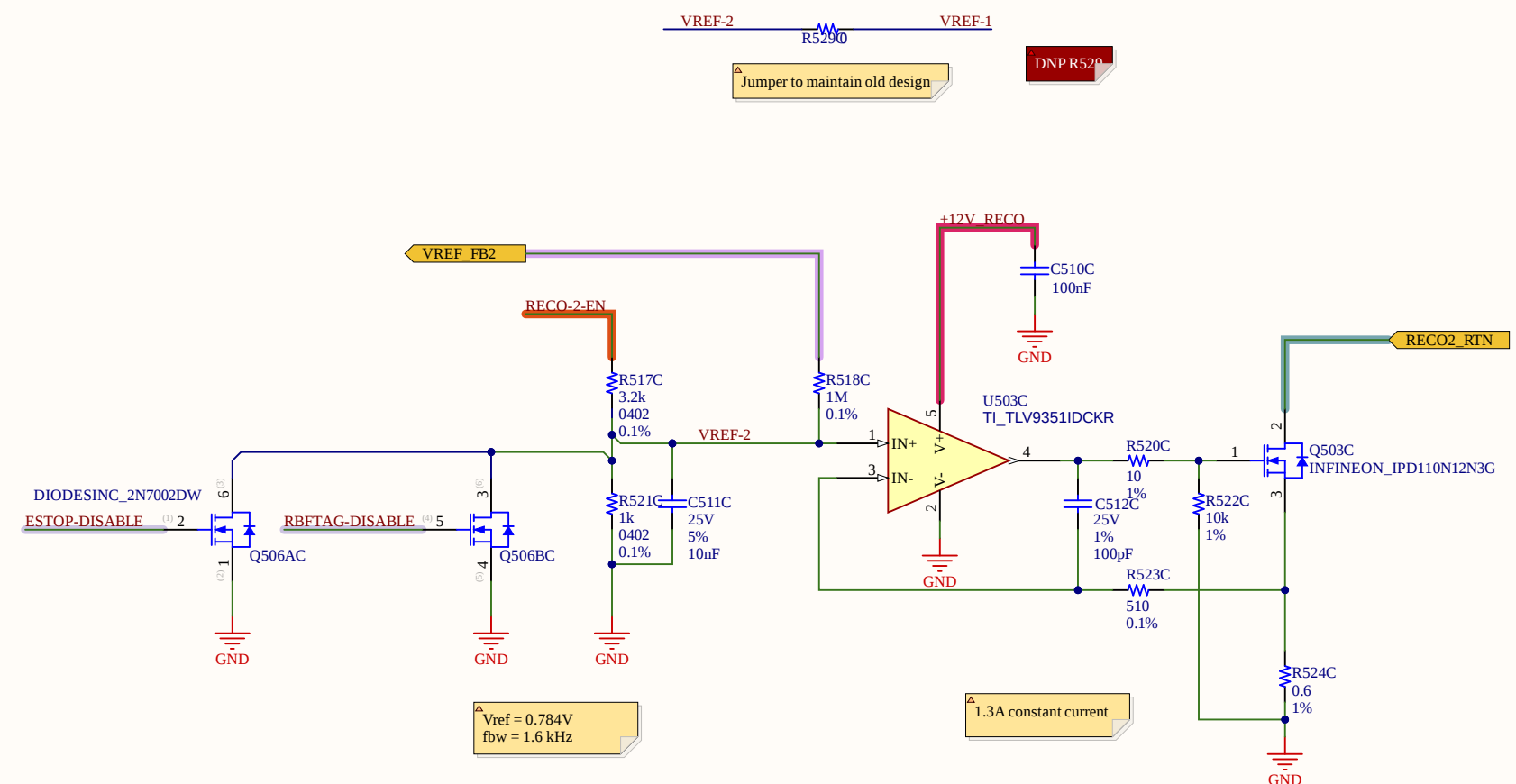
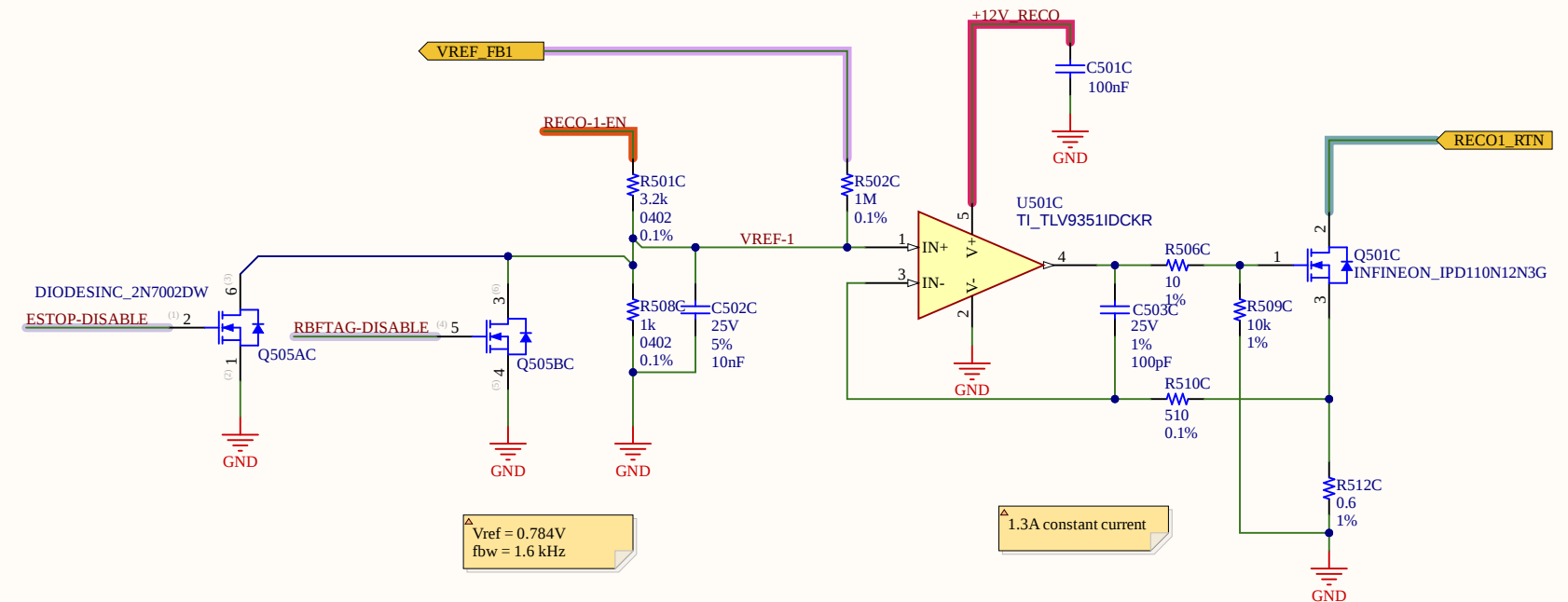
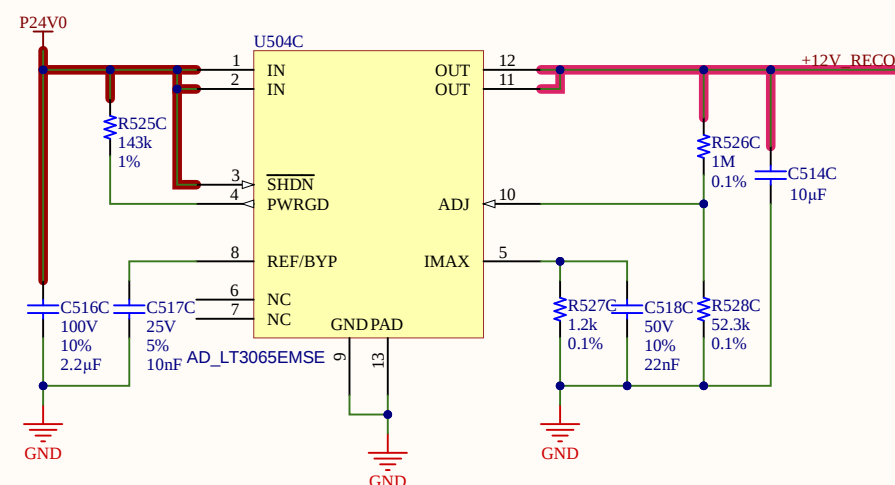
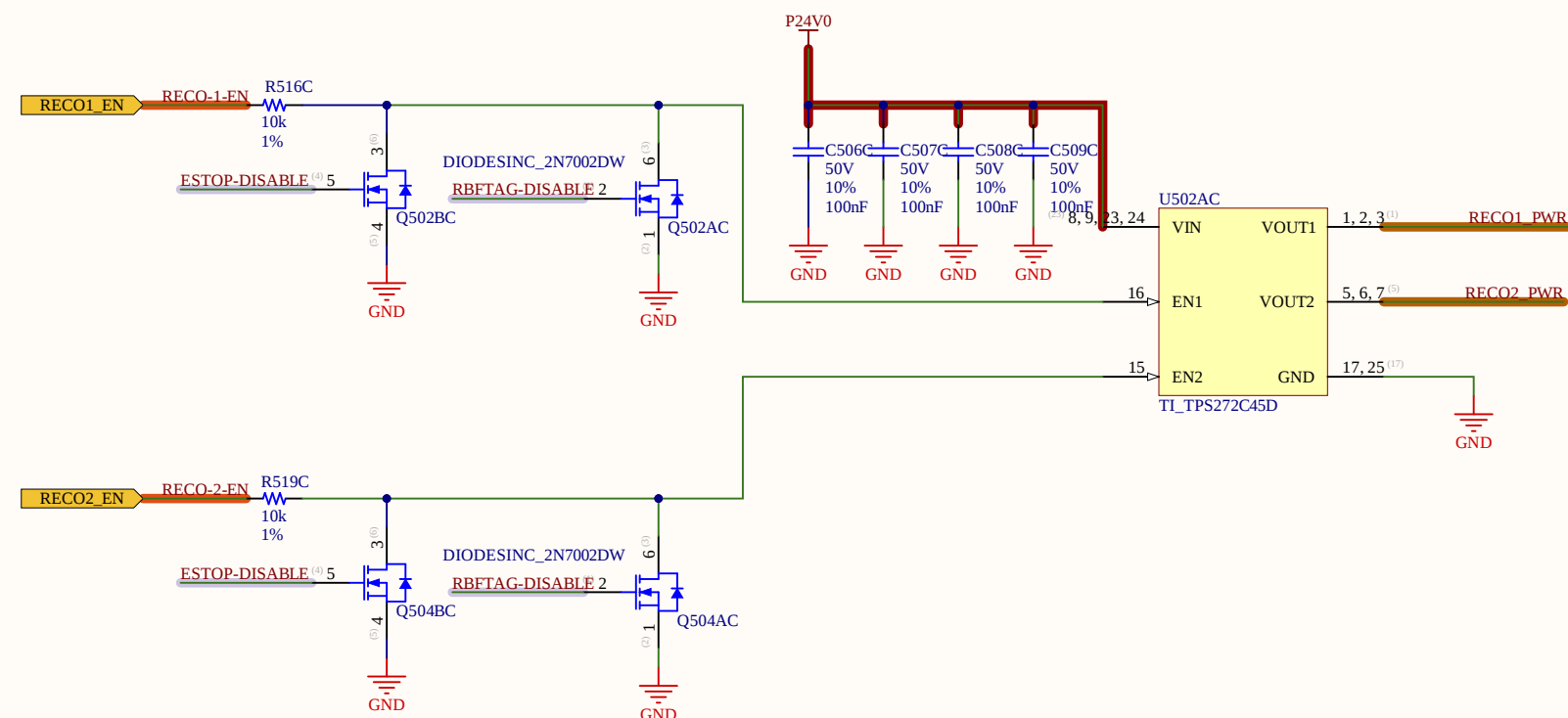
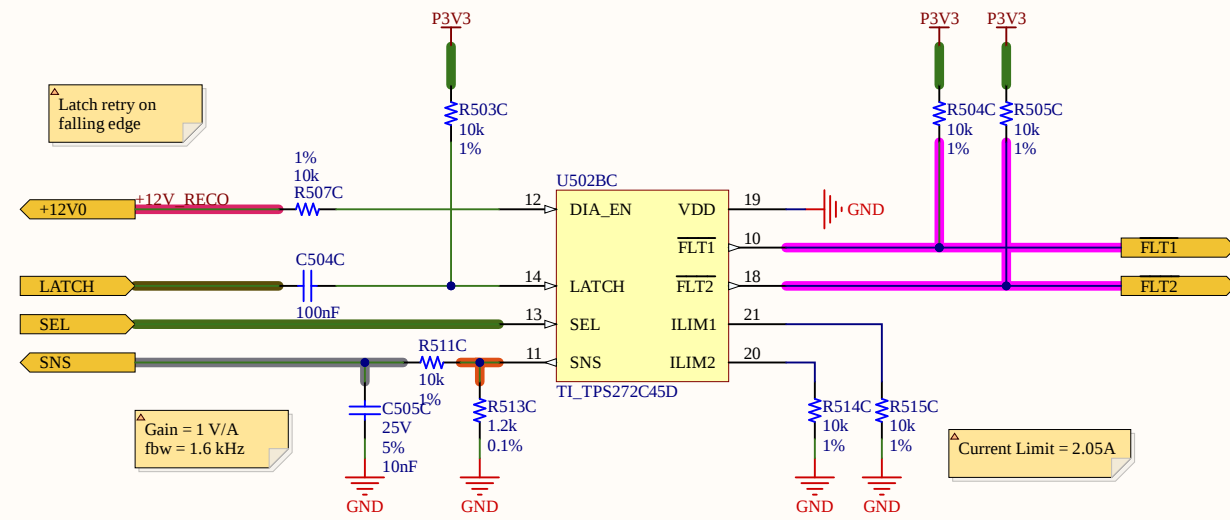
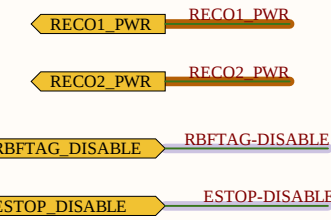


Vref = 0.784V  
fbw = 1.6 kHz

1.3A constant current

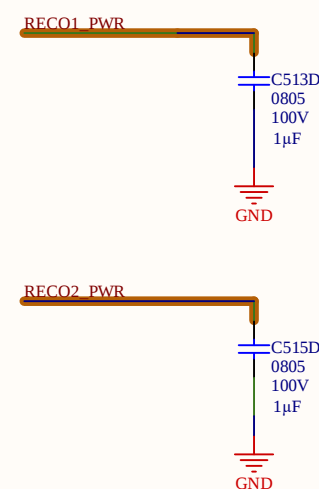
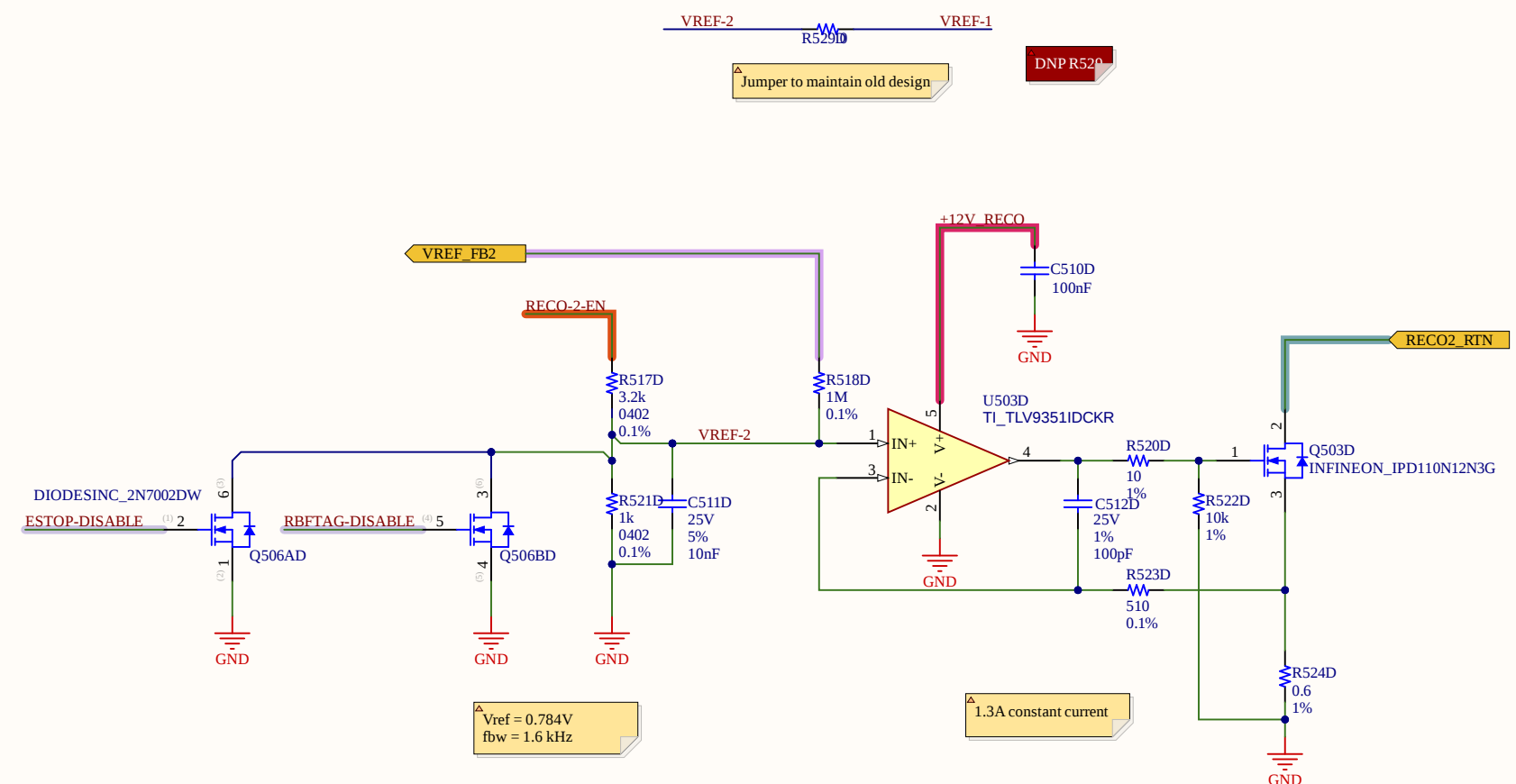
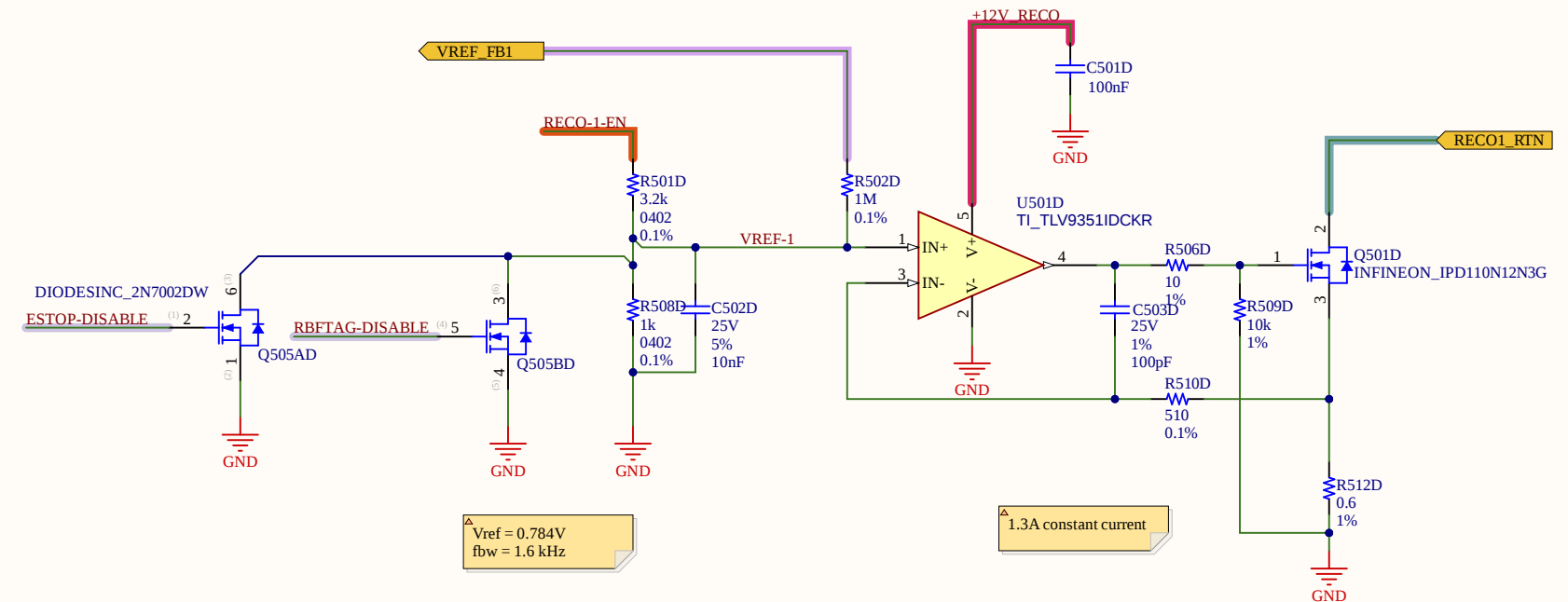
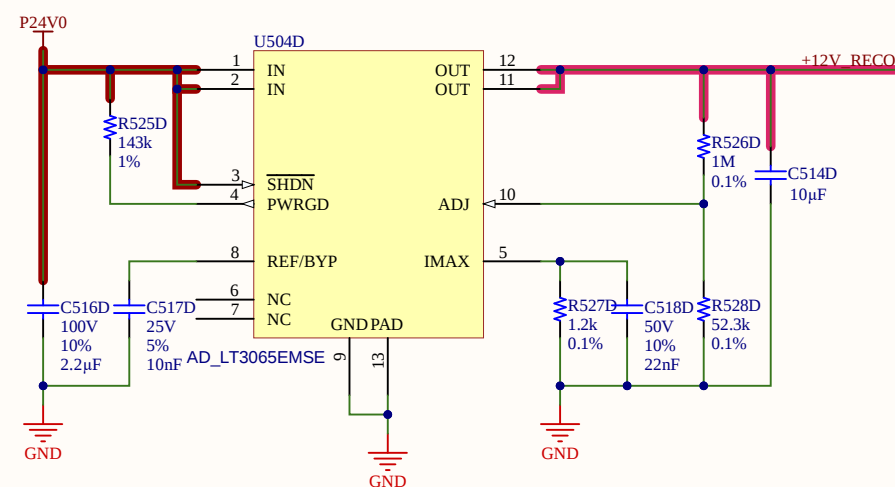
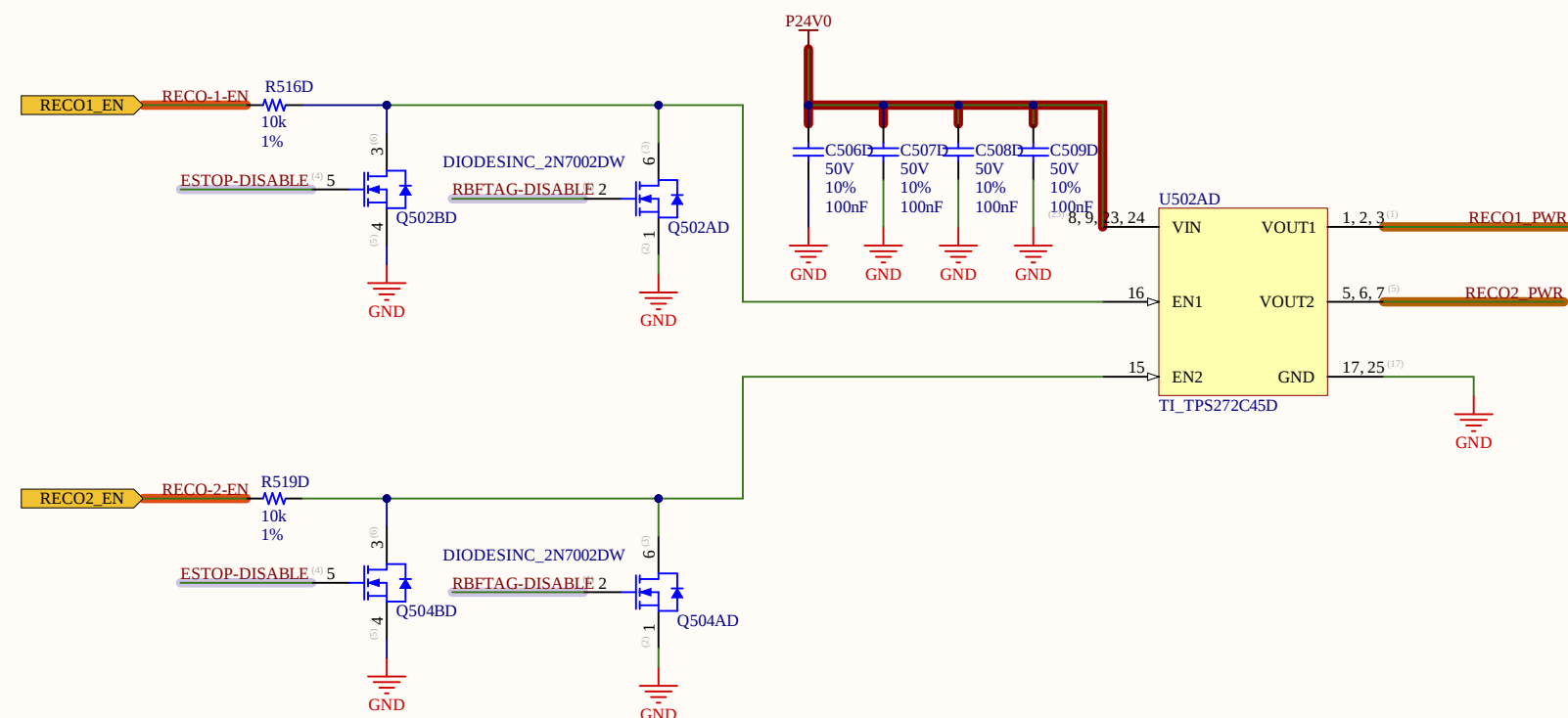
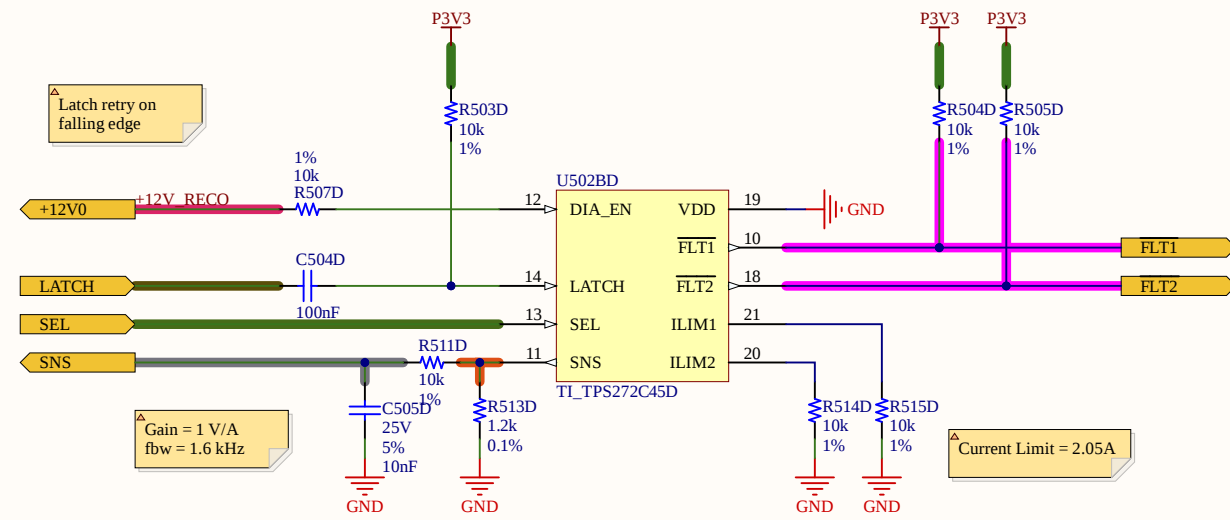
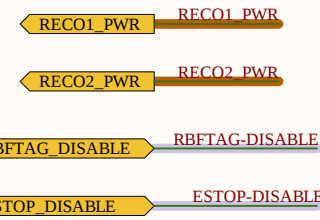


Δ Changes from last rev  
- changed from version C of IC to version D for 2x fault pins



Informational Notes   Layout Notes   Software Notes   Assembly Notes   Todo Items

Δ Changes from last rev  
- changed from version C of IC to version D for 2x fault pins



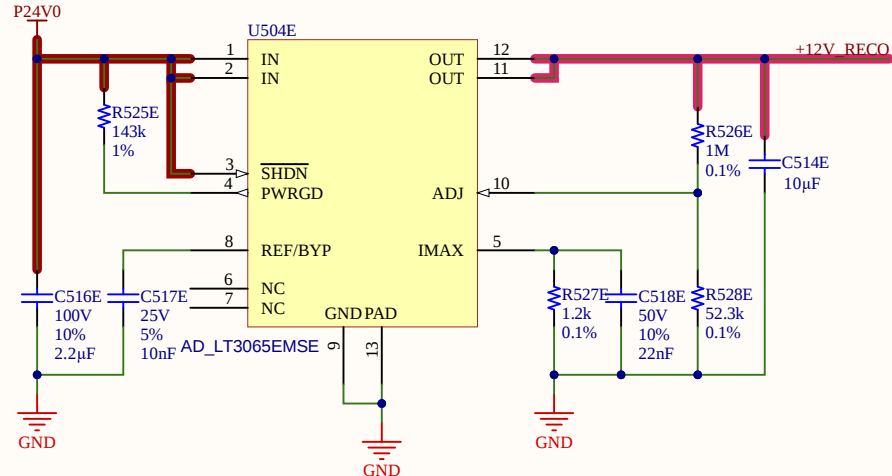
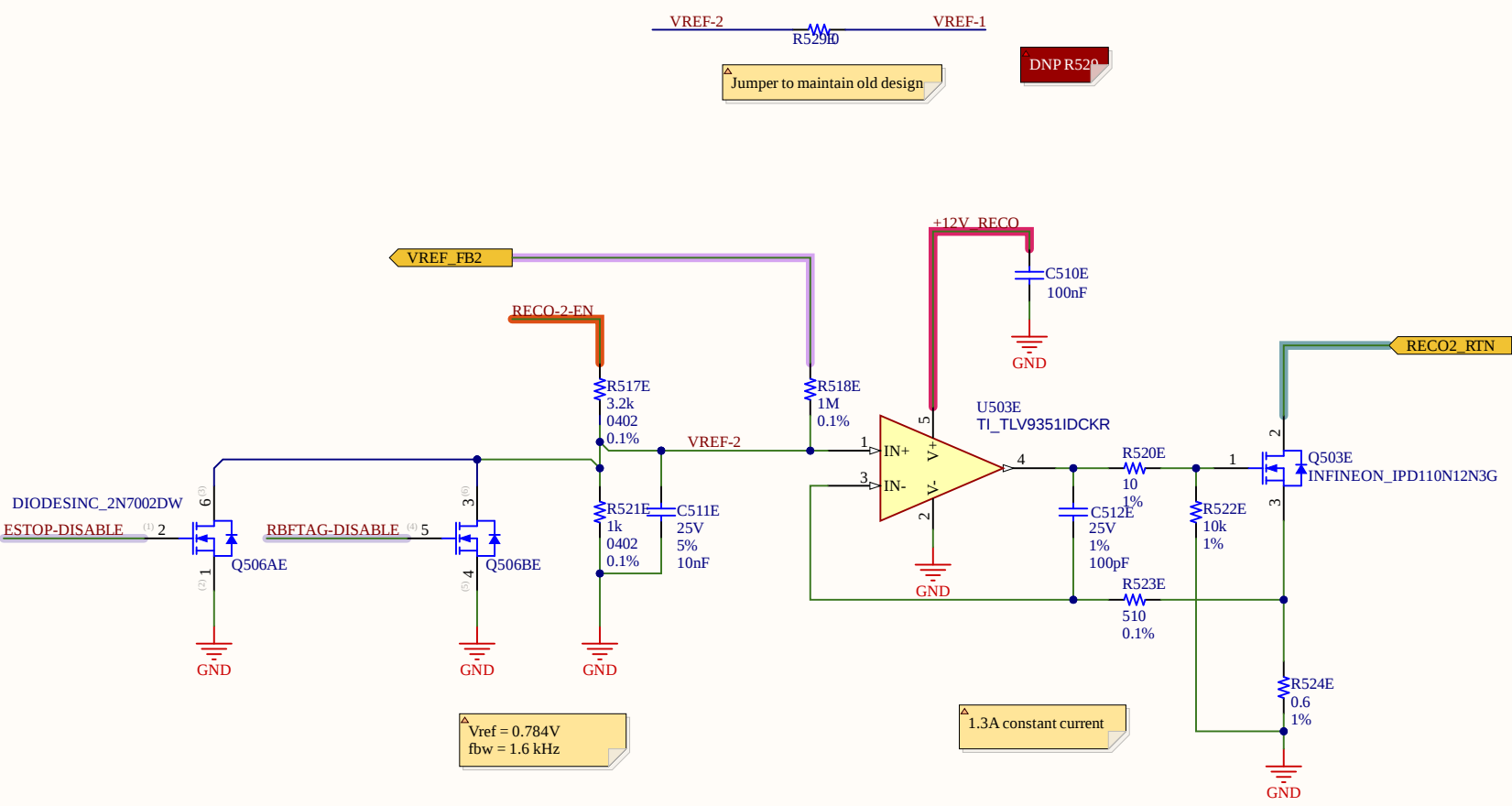
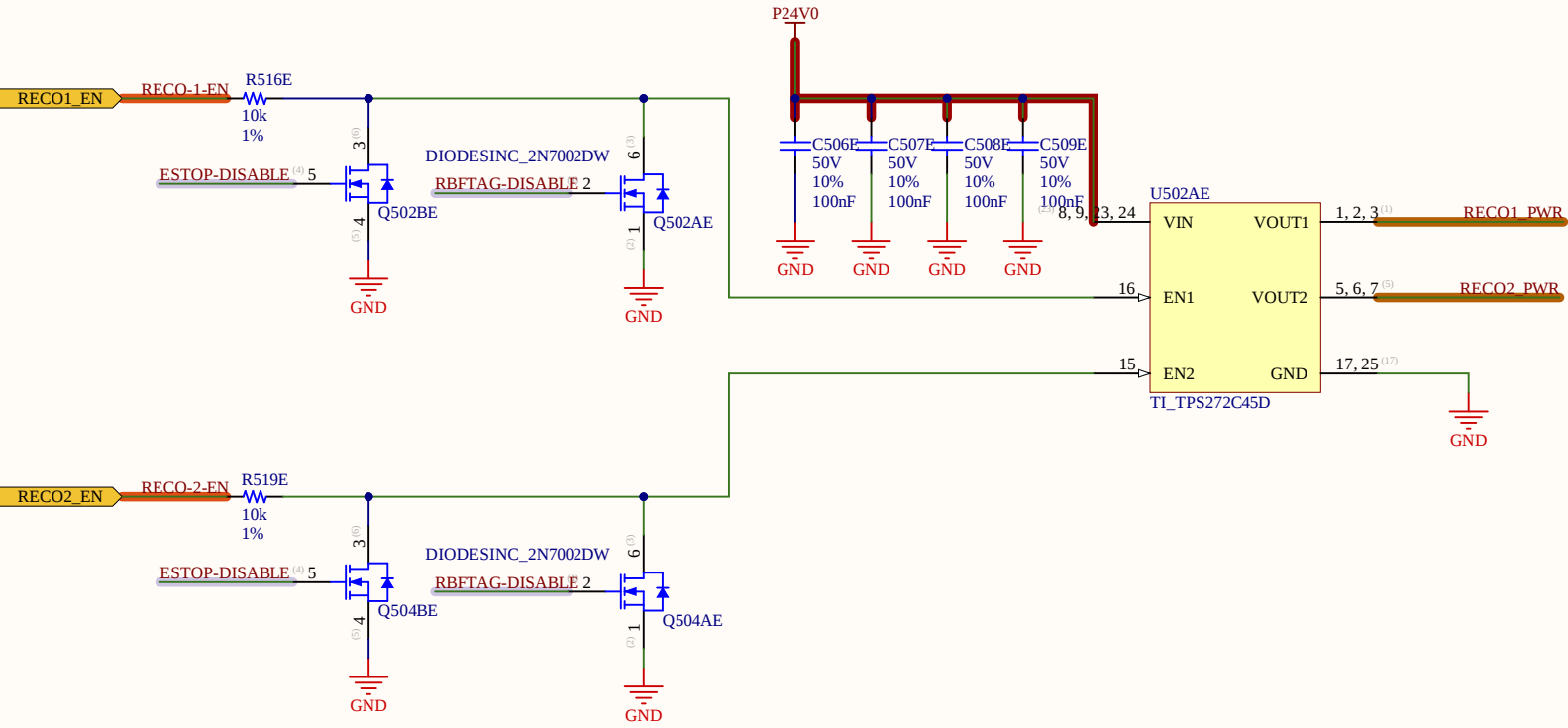
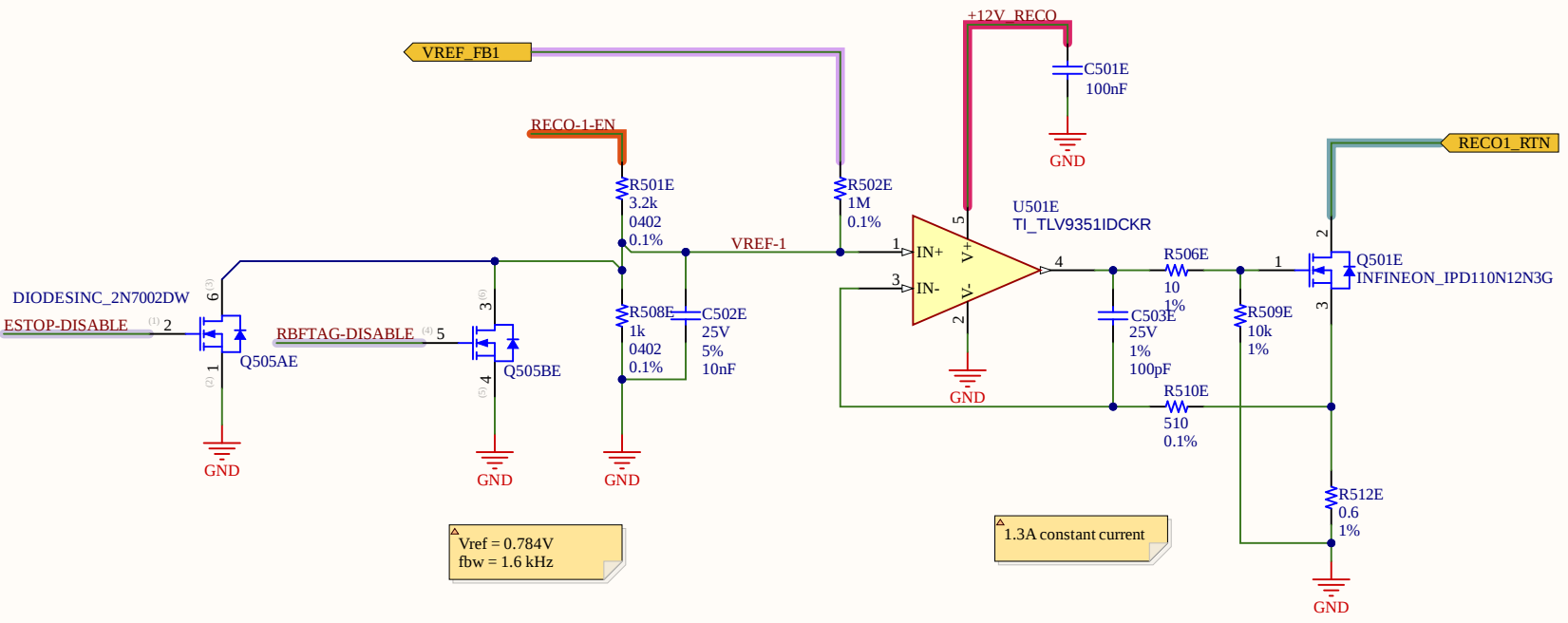
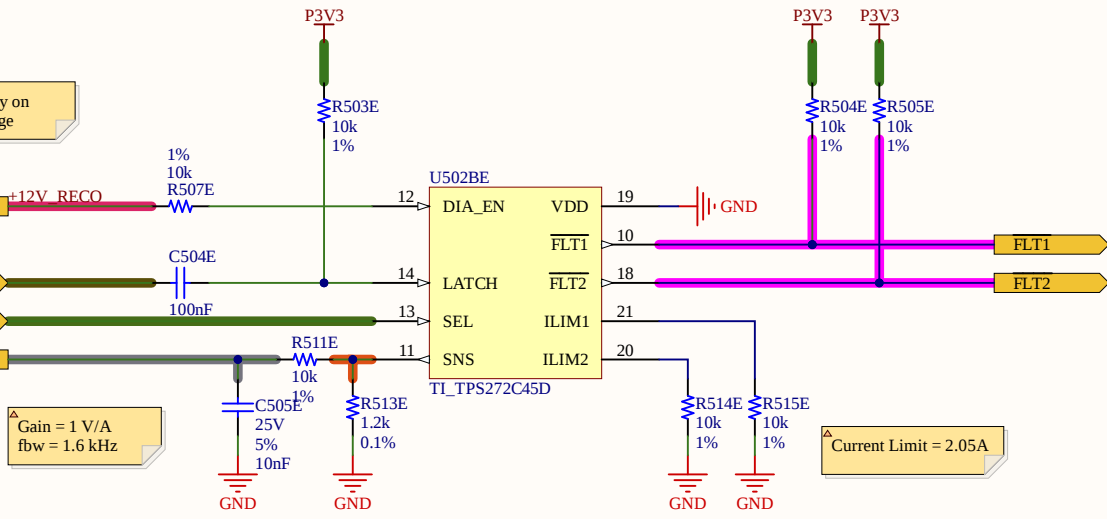
RECOVERY DRIVERS

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- ESTOP\_DISABLE

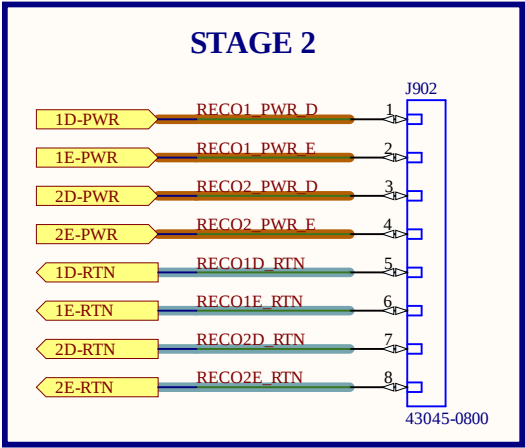
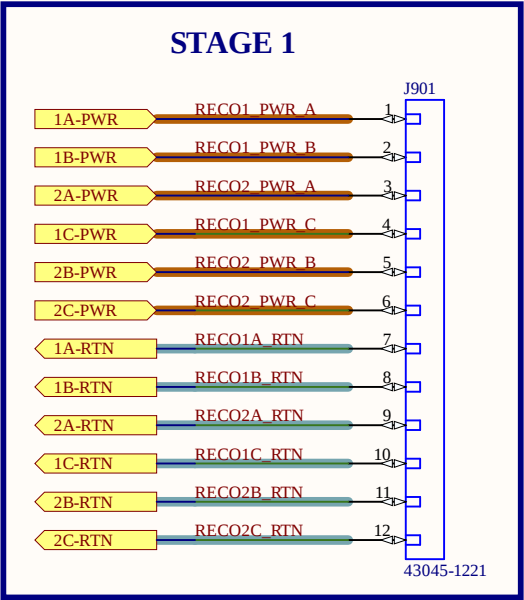
Latch retry on  
falling edge



OUTPUT CONNECTORS

- Informational Notes
- Layout Notes
- Software Notes
- Assembly Notes
- Todo Items

Changes from last rev  
- new 12 pin and 8 pin connectors



|                                              |                                                                                                                                        |                                                            |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Project: <b>Recovery_Board.PrjPcb</b>        |                                                                                                                                        |                                                            |
| Sheet Title: <b>Output Connectors.SchDoc</b> |                                                                                                                                        |                                                            |
| Size: <b>A4</b>                              | Schematic Designer: <b>Pratham Ingale</b><br>PCB Layout Designer: <b>Pratham Ingale</b><br>Responsible Engineer: <b>Pratham Ingale</b> | Yellow Jacket Space Program<br>Georgia Tech<br>Atlanta, GA |
| Date: <b>7/22/2026</b>                       | Revision: <b>5.0</b>                                                                                                                   |                                                            |
| Sheet: <b>13</b> of: <b>13</b>               |                                                                                                                                        |                                                            |

