Design Review Notes

OreSat Command, Control, and Communications Card

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Introduction

This document summarizes the notes taken during our two design review meetings. Our first meeting was with Andrew Greenberg on Sunday 11/17/2019 and our second meeting was with Team 11 on Tuesday 11/19/2019. Scribbled notes, which would be largely unintelligible to the untrained eye, were initially jotted down during the design reviews, then after the meetings, our team convened to elucidate the findings of the design reviews and make a list of actions for us to take moving forward. The resulting actions, and therefore the conclusions of the design reviews and notes, are summarized in the following section.

Design Review Notes/Conclusions

Breakouts Sheet 1:

- JP5 or JP6 need removed
- More test points should be added throughout the board
- Add jumper from AX5043 to ORESAT bus card
- Mark test points on radio breakout pins
- Change net names on radio headers to match names on MCU

Power Sheet 2:

- Provide proper name to CB_IC net
- Move resistor, ground and testpoint from pin 6 of circuit breaker IC to pin 7(!FLT->ILIM)
- Set undervoltage lockout to 5V(Adjust pin 3 voltage divider resistor values)
- Make text note of lockout undervoltage value(5V)
- Make text note of current limit(302 mA)
- Route CB_I_OUT to analog pin on MCU to monitor switch output current
- Add 2.5 V LDO for radio daughter boards*

~~*May not be necessary. Await further instructions.~~
Not necessary.

OPD Sheet 3:

- Make OPD power on LED a separate branch on schematic
- Rename !OPD_ON/OFF net to !OPD_ENABLE
- Add Pull up resistor to pin 3 on U1(!ON)
- Add pull up resistor to pin 6 on U1(!fault)
- Make a note on schematic that current limit is set to 50 mA by resistor on pin 5 (SET)
- Add pull up resistors to OPD_I2C lines tying them to OPD_PWR not 3.3V net

MCU Sheet 4:

- Put a note on USART2_RX indicating internal pull up resistor to 3.3V

- Double check that NRST does not require an external pull up tp 3.3V
- Move watchdog LED and resistor near the actual watchdog IC on both schematic and board layout
- Add more capacitors for the unused power pins there are atleast 6 power pins. This is clearer on the board layout
- Route OPD_I_SET to an analog pin on the MCU PB10 is a digital input
- Route CB_I_OUT, U4 pin 7, to an analog input on the MCU
- Add test points to unused GPIO as is practical
- Add a 1uF cap to VDD on SD Card
- Add a 10k pull up to MMC_PWR
- Add a bypass cap on 3.3V Watchdog power
- Add Diode-RC circuit to Watchdog Power as per Andrew's recommendation
- Add a testpoint to WDT net on watchdog timer
- Set delay times to 3s and 3s(1,0,0)

ERC:

- Change VIN and VOUT pins to power on the MAX892 symbol U1
- Change VIN and VOUT pins to power on the TPS2596 Symbol U4
- Remove OPD_CB_RESET net. It is unused. (PBD 2 on U7)
- Add useful name to U7

Board Layout:

- Route all 3.3V power to layer 15. This is the power plane.
- Check SD Card placement. It can't go past the line on the TSTOP layer indicating where the card is clamped into the CubeSAT backplane.
- Draw in the radio daughter board physical outline. Make sure it does not encroach into any headers.
- Fix angles on the JTAG traces
- Change all signal traces to 0.2 mm
- Make vias uniform
- Route VBUS and VBUSP to layer 15
- Add more stitching throughout board