DSG-RICH R&D Meeting Minutes

Date: April 23, 2021
Time: 11:00AM – 12:00PM

Attendees: Mary Ann Antonioli, Peter Bonneau, Aaron Brown, Pablo Campero, Brian Eng, George Jacobs, Tyler Lemon, Marc McMullen, and Amrit Yegneswaran

1. **Prototyping of SHT35 readout circuit**
   Tyler Lemon and Marc McMullen
   - Determined capacitance of flat CAT7 cable procured for prototyping is ~30 pF/foot
     - Capacitance determined by using oscilloscope to measure RC time constant of circuit with cable (acting as capacitor) in series with a 1-kΩ resistor
   - Pull-up resistors should be ~300 Ω on clock and data lines between buffer drivers
     - Talk presented on subject
   - Generated Bill of Materials
   - Will order fabrication of five PCBs of first design

2. **sbRIO RMC and backplane PCB design sketches**
   Mary Ann Antonioli, Peter Bonneau, Brian Eng, Tyler Lemon, and Marc McMullen
   - Modified RMC Serial Data – Serial Clock Circuit diagram to have one ground connection for every data line on J2 (Fig. 1)
     - Originally, SCL was paired with 3.3 V, but since backplane PCB was changed to get 3.3 V power from external power supply, the 3.3 V at J2 is unneeded.
   - Modified RMC Backplane PCB Circuit diagram (Fig. 2)
     - A. On J1, changed 3.3 V lines to ground connections
       - Corresponds to change made to RMC on Fig. 1
     - B. Added J30 for connecting external 3.3 V power supply
       - Originally, 3.3 V came from J1 connector, but since all of those 3.3 V connections were changed to ground connections, PCB needed a connection to external 3.3 V power supply.
     - C. Added R3 and R4 for RJ-45's LEDs
       - LEDs typically need current limiting resistors, so added them to PCB in case RJ-45 port does not have them built in.
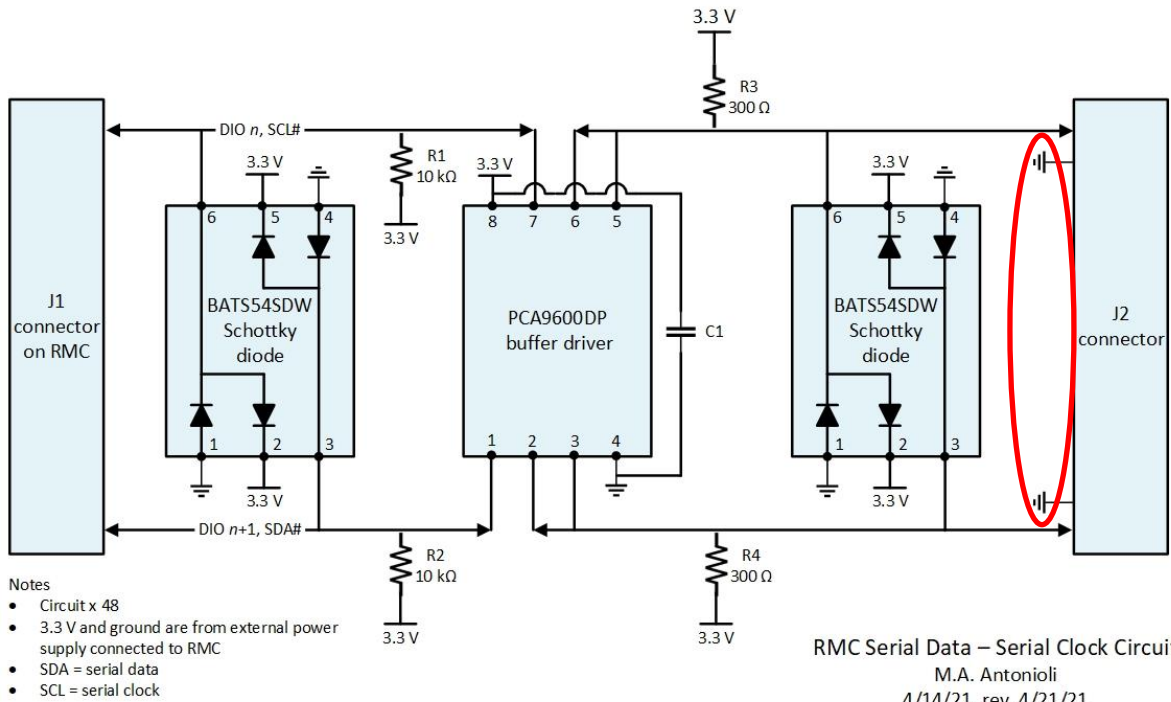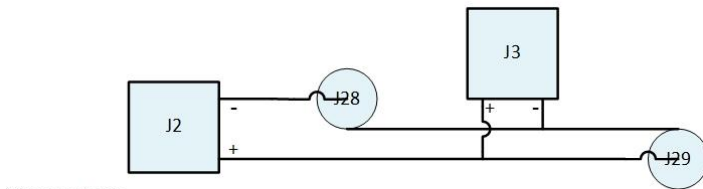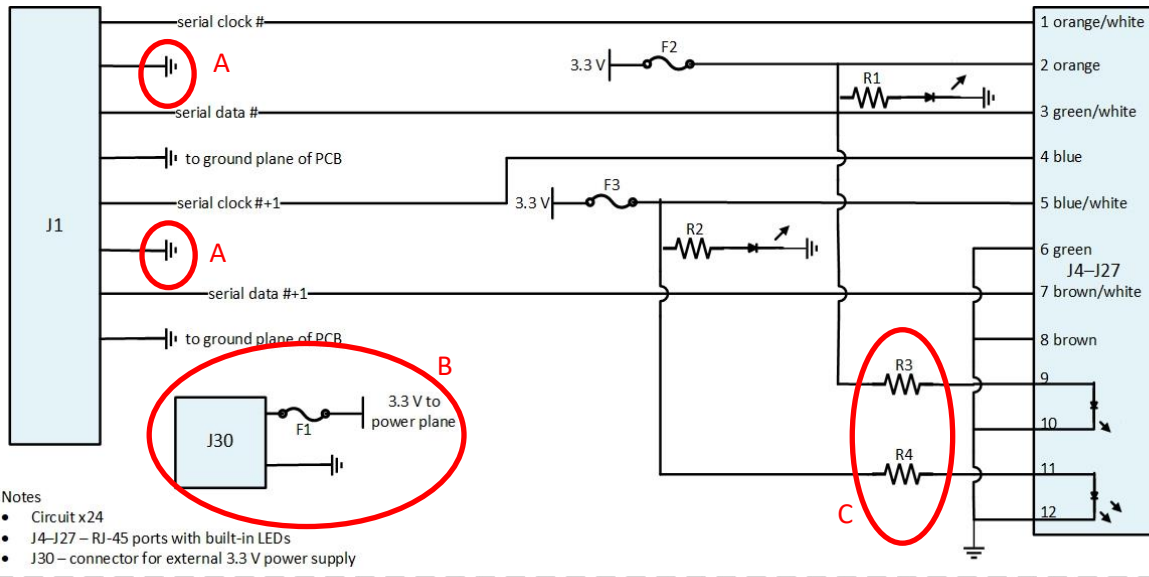
Fig. 1 RMC's I^{2}C circuit for one sensor

Fig. 1 label text:

DIO *n*, SCL#

3.3 V

R1 10 kΩ

3.3 V

3.3 V

R3 300 Ω

3.3 V

J1 connector on RMC

6 5 4

BATS54SDW Schottky diode

1 2 3

3.3 V

8 7 6 5

PCA9600DP buffer driver

1 2 3 4

C1

6 5 4

BATS54SDW Schottky diode

1 2 3

3.3 V

J2 connector

DIO *n*+1, SDA#

R2 10 kΩ

3.3 V

R4 300 Ω

3.3 V

Notes
- Circuit x 48
- 3.3 V and ground are from external power supply connected to RMC
- SDA = serial data
- SCL = serial clock

RMC Serial Data – Serial Clock Circuit
M.A. Antonioli
4/14/21, rev. 4/21/21

Fig. 1 RMC's I^{2}C circuit for one sensor

Fig. 2 label text:

serial clock #

A

3.3 V

F2

1 orange/white

2 orange

R1

serial data #

3 green/white

to ground plane of PCB

4 blue

serial clock #+1

3.3 V

F3

5 blue/white

A

R2

6 green

J4–J27

serial data #+1

7 brown/white

to ground plane of PCB

8 brown

B

R3

9

J1

J30

F1

3.3 V to power plane

10

R4

11

C

12

Notes
- Circuit x24
- J4–J27 – RJ-45 ports with built-in LEDs
- J30 – connector for external 3.3 V power supply

J3

J2

J28

J29

Connector Notes
- J2 – from RMC interlock out
- J3 – from override switch
- J28 – 00-sized feedthrough for daisy-chaining to external cRIO
- J29 – 00-sized port feedthrough for connection to CAEN mainframe

RMC Backplane PCB Circuit
M.A. Antonioli
4/16/21 rev. 4/21/21

Fig. 2 Backplane PCB diagram