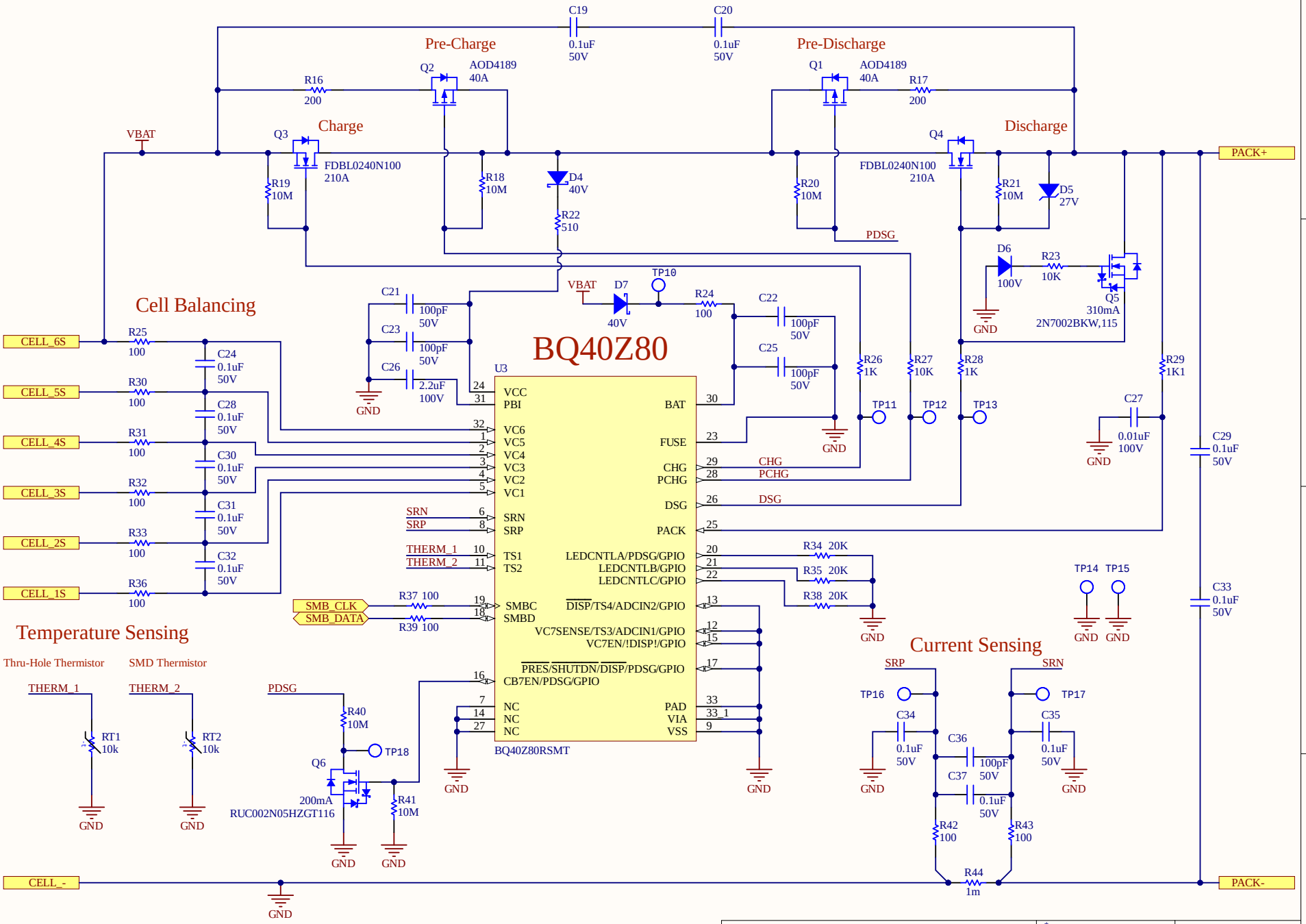
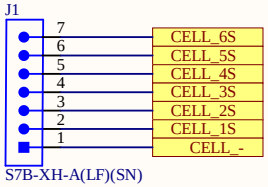
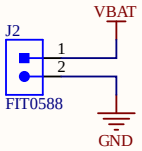

Pre-Charge
Pre-Discharge
Charge
Discharge
Cell Balancing
BQ40Z80
Temperature Sensing
Current Sensing
Thru-Hole Thermistor
SMD Thermistor
VBAT
PACK+
PACK-
CELL_6S
CELL_5S
CELL_4S
CELL_3S
CELL_2S
CELL_1S
CELL_-
SMB_CLK
SMB_DATA
SRN
SRP
THERM_1
THERM_2
PDSG
CHG
PCHG
DSG
GND
U3
BQ40Z80RSMT
FDBL0240N100
210A
AOD4189
40A
2N7002BKW,115
RUC002N05HZGT116
200mA
310mA
VCC
PBI
VC6
VC5
VC4
VC3
VC2
VC1
SRN
SRP
TS1
TS2
SMBC
SMBD
CB7EN/PDSG/GPIO
NC
NC
NC
BAT
FUSE
CHG
PCHG
DSG
PACK
LEDCNTLA/PDSG/GPIO
LEDCNTLB/GPIO
LEDCNTLC/GPIO
DISP/TS4/ADCIN2/GPIO
VC7SENSE/TS3/ADCIN1/GPIO
VC7EN/!DISP!/GPIO
PRES/SHUTDN/DISP/PDSG/GPIO
PAD
VIA
VSS
R16 200
R17 200
R18 10M
R19 10M
R20 10M
R21 10M
R22 510
R23 10K
R24 100
R25 100
R26 1K
R27 10K
R28 1K
R29 1K1
R30 100
R31 100
R32 100
R33 100
R34 20K
R35 20K
R36 100
R37 100
R38 20K
R39 100
R40 10M
R41 10M
R42 100
R43 100
R44 1m
C19 0.1uF 50V
C20 0.1uF 50V
C21 100pF 50V
C22 100pF 50V
C23 100pF 50V
C24 0.1uF 50V
C25 100pF 50V
C26 2.2uF 100V
C27 0.01uF 100V
C28 0.1uF 50V
C29 0.1uF 50V
C30 0.1uF 50V
C31 0.1uF 50V
C32 0.1uF 50V
C33 0.1uF 50V
C34 0.1uF 50V
C35 0.1uF 50V
C36 100pF 50V
C37 0.1uF 50V
D4 40V
D5 27V
D6 100V
D7 40V
RT1 10k
RT2 10k
Q1
Q2
Q3
Q4
Q5
Q6
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP18
Title Battery Manager
Size: Letter
Drawn By: Ayesha Ebrahim
Date: 2020-05-13
Sheet * of *
File: C:\Users\ayesh\Documents\GitHub\MarsRover2020-PCB\Projects\BMS\Rev1\Battery Manager.SchDoc
UW ROBOTICS TEAM

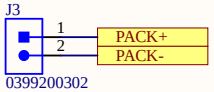
Battery Balancing



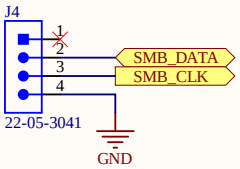
Battery In



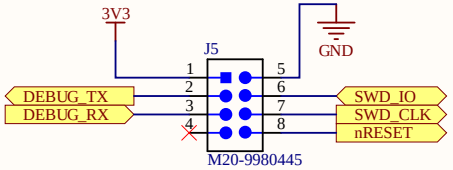
Pack Out



EV2400

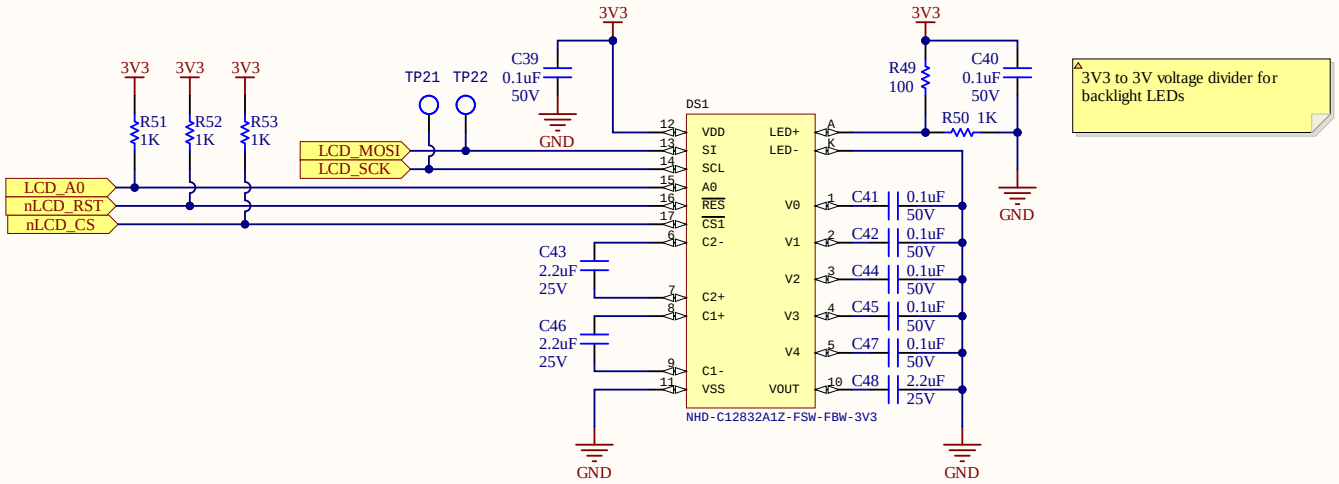


Debug/Programing



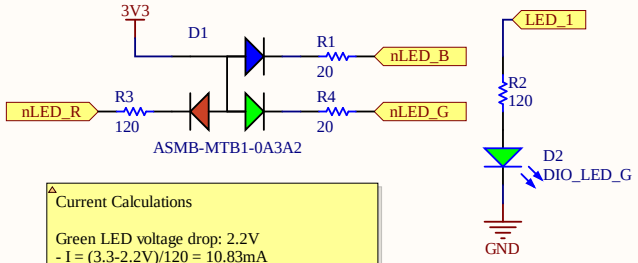
Title Connectors		UW Robotics 200 University Avenue Waterloo Ontario Canada N2L 3G6
Size: Letter	Drawn By: Ayesha Ebrahim	
Date: 2020-05-13	Sheet of	
File: C:\Users\ayesh\Documents\GitHub\MarsRover2020-PCB\Projects\BMS\Rev1\Connectors.SchDoc		

LCD



Title LCD			
Size: Letter	Drawn By: Ayesha Ebrahim		
Date: 2020-05-13	Sheet * of *		
File: C:\Users\ayesh\Documents\GitHub\MarsRover2020-PCB\Projects\BMS\Rev1\LCD.SchDoc			

Test LEDs

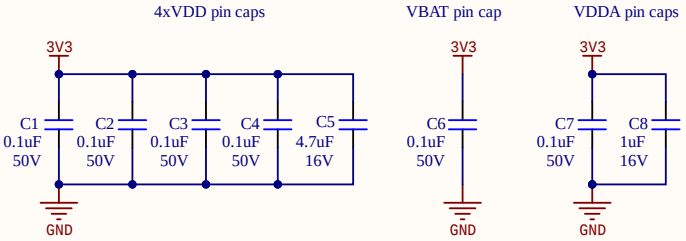


Current Calculations

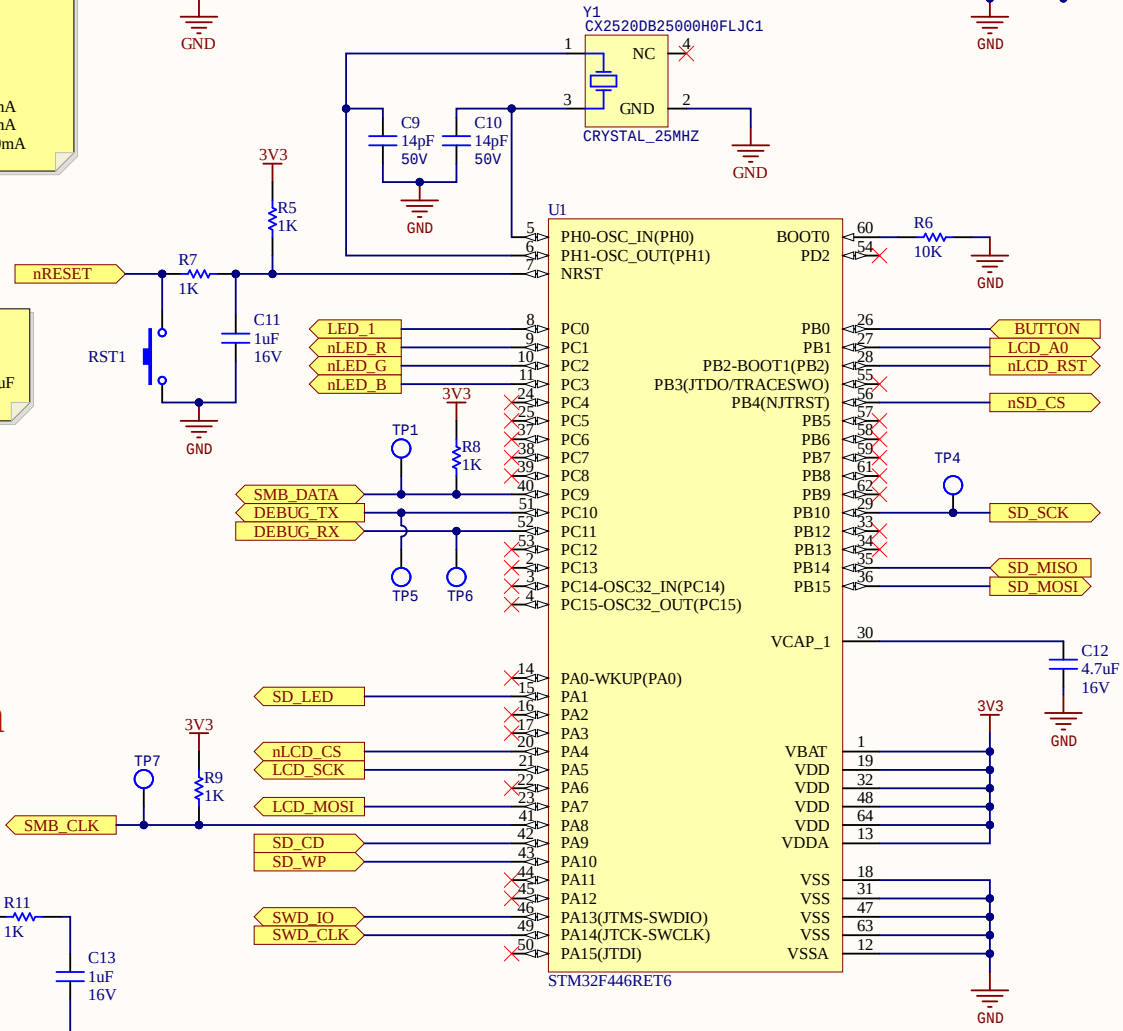
Green LED voltage drop: 2.2V
- I = (3.3-2.2V)/120 = 10.83mA

RGB LED voltage drops:
- Red: 2.1V: I = (3.3-2.1V)/120 = 10mA
- Blue: 3.1V: I = (3.3-3.1V)/20 = 10mA
- Green: 3.1V: I = (3.3-3.1V)/20 = 10mA

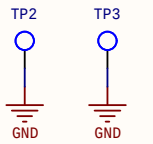
Decoupling Caps



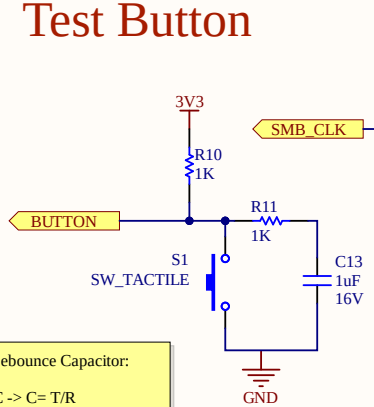
STM32F446RET6



GND Test Points



Test Button



For Debounce Capacitor:

T=RC -> C= T/R
C=0.001ms/1000Ohms= 1uF

Title MCU			
Size: Letter	Drawn By: Ayesha Ebrahim		
Date: 2020-05-13	Sheet * of *		
File: C:\Users\ayesh\Documents\GitHub\MarsRover2020-PCB\Projects\BMS\Rev1\MCU.SchDoc			

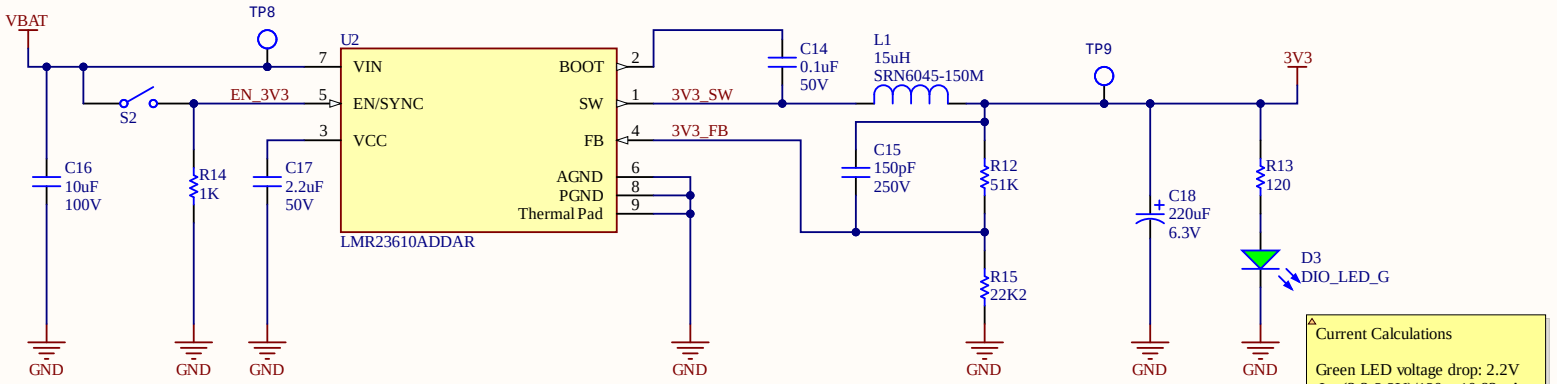
Battery Voltage to 3V3 Buck @ 1A Max

Designed for 15V-25.2V input

Route for 0.5A in

Inductor: SRN6045-150M
15uH, 20%, 95.8mOhm DCR (max)
1.9A (rms), 2.3A (sat), 4.5mm tall

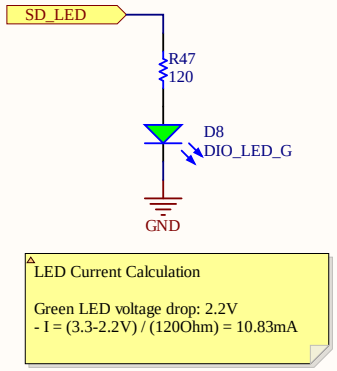
Route for 1A out

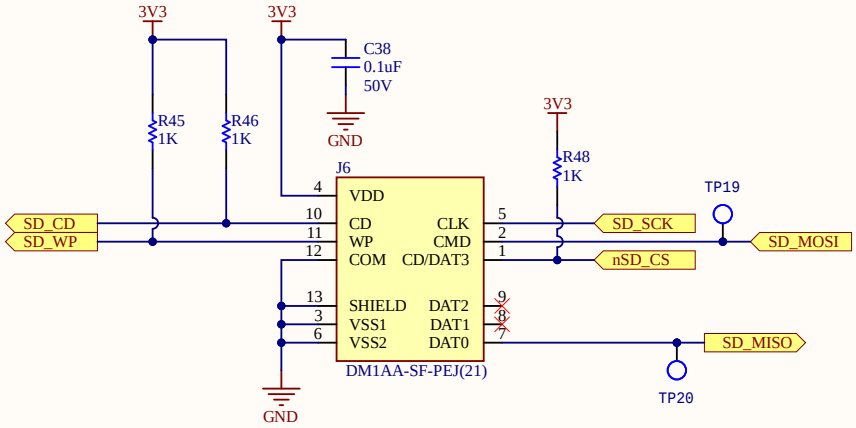


Max expected power on output = 1.65W
Max current = 0.5A
Expected Efficiency at 1A > 87.7%

Title Power		
Size: Letter	Drawn By: Ayesha Ebrahim	
Date: 2020-05-13	Sheet * of *	
File: C:\Users\ayesh\Documents\GitHub\MarsRover2020-PCB\Projects\BMS\Rev1\Power.SchDoc		

SD Card Connector





Title SD Card			
Size: Letter	Drawn By: Ayesha Ebrahim		
Date: 2020-05-13	Sheet * of *		
File: C:\Users\ayesh\Documents\GitHub\MarsRover2020-PCB\Projects\BMS\Rev1\SD Card.SchDoc			