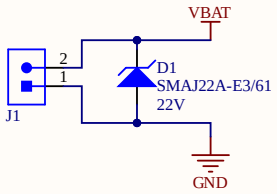
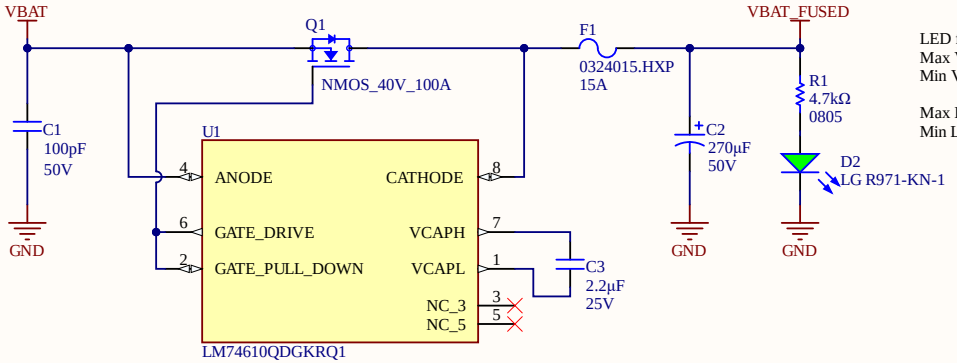
24V Input



Rated Current = 16A

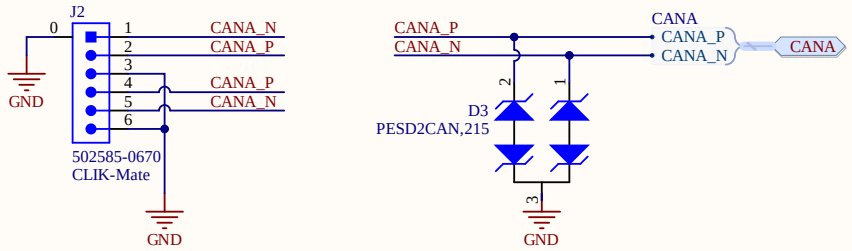
TODO:
- What is the actual rated current?

Reverse Polarity Protection

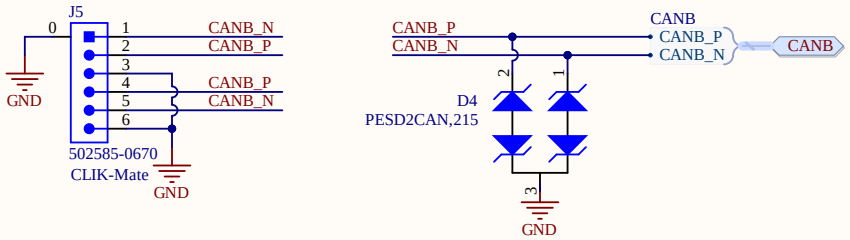


Title Power Distribution Board Rev2 - Power		Altium Limited L3, 12a Rodborough Rd Frenchs Forest NSW Australia 2086	UW ROBOTICS TEAM
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 1 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH1 - POWER.SchDoc			

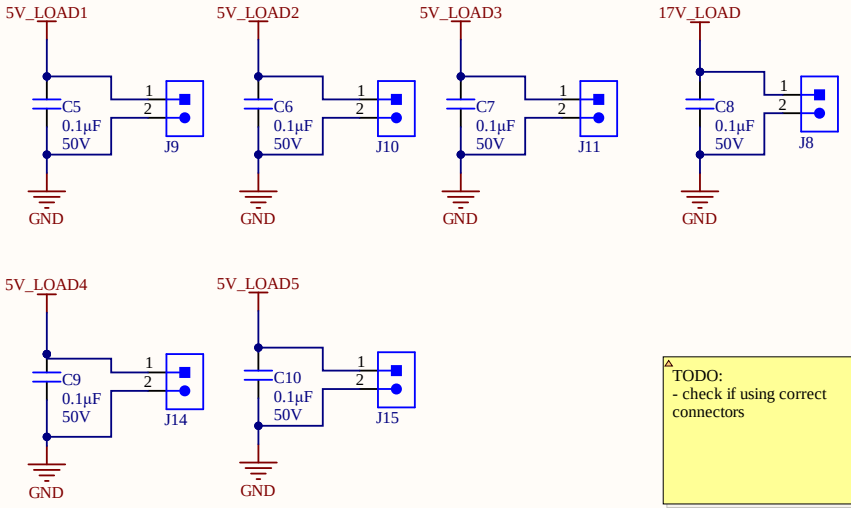
CAN BUS A



CAN BUS B



5V Output

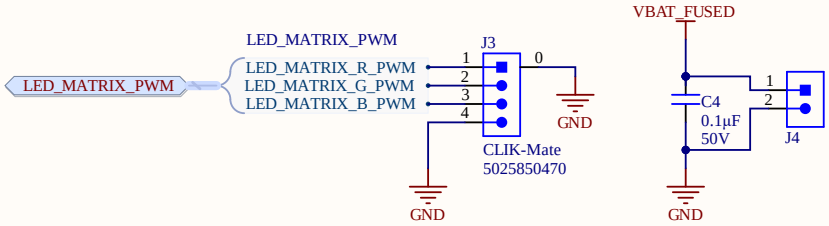


17V Output

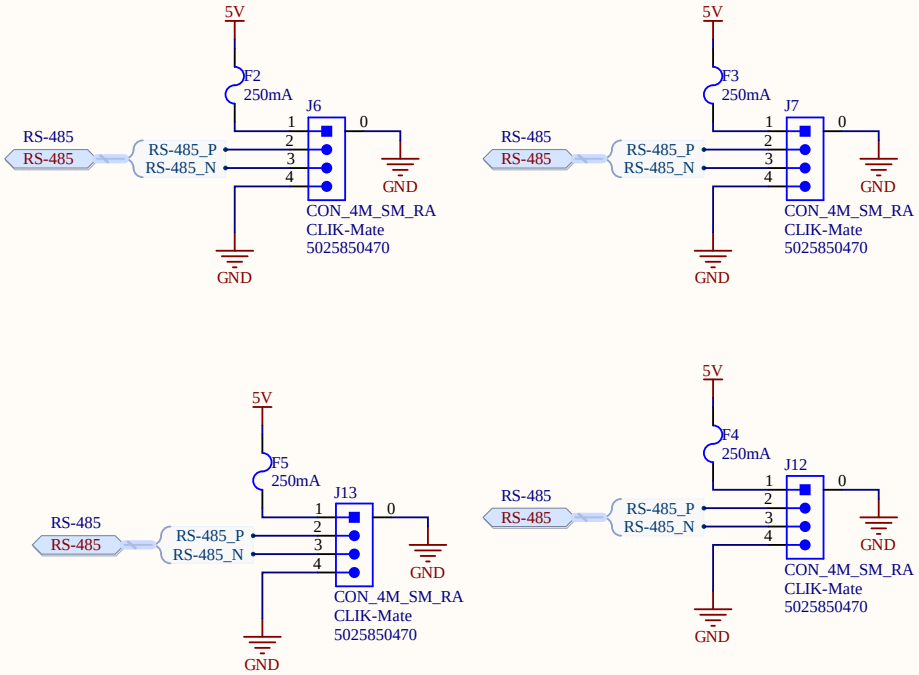
TODO:
- check if using correct connectors

Can use 12-26AWG

LED Matrix



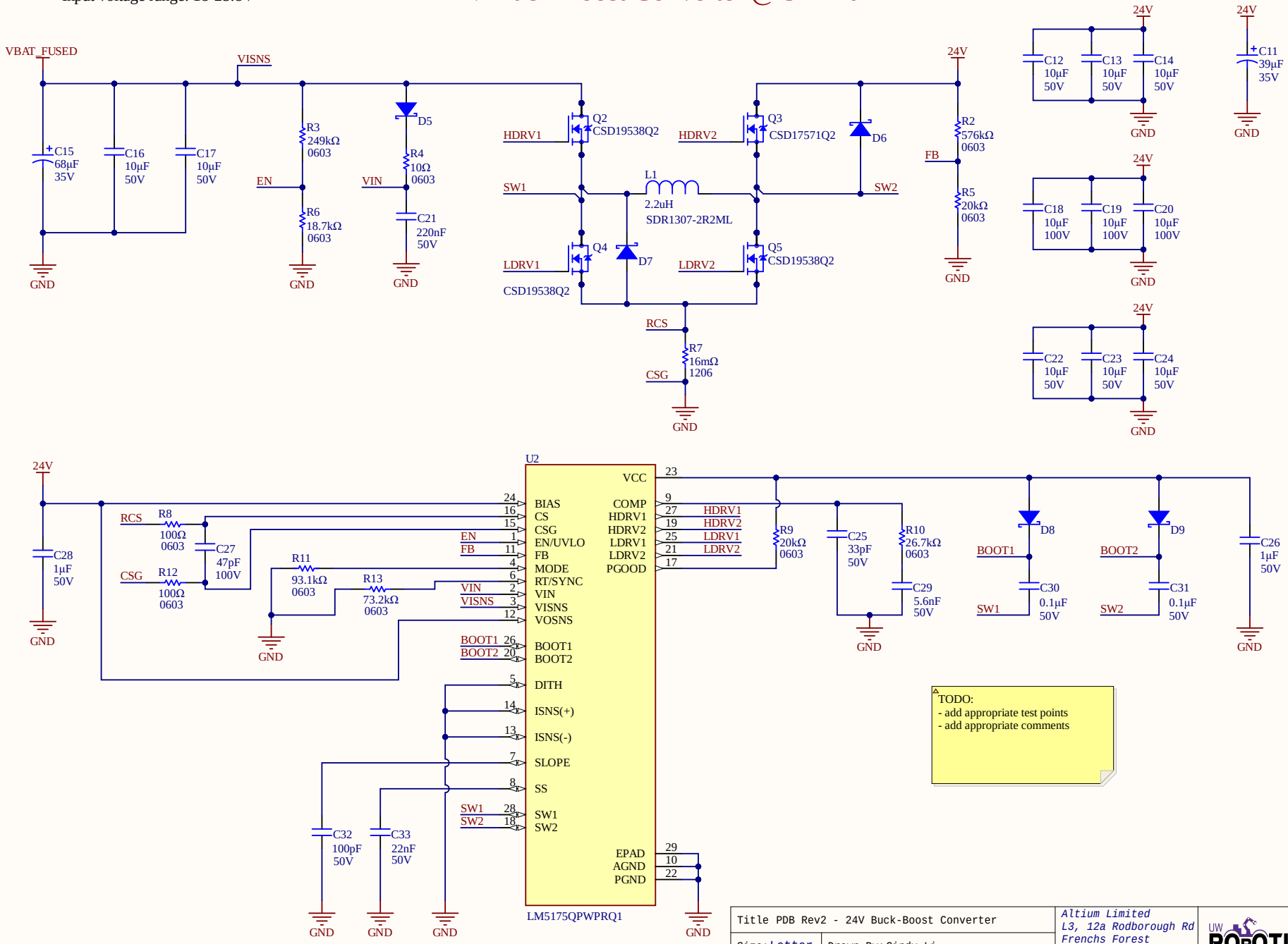
URM04 Ultrasonic Sensors



Title Power Distribution Board Rev2 - Connectors		Altium Limited L3, 12a Rodborough Rd Frenchs Forest NSW Australia 2086	UW ROBOTICS TEAM
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 2 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH2 - CONNECTORS.SchDoc			

Input voltage range: 18-25.8V

24V Buck-Boost Converter @ 3A Max

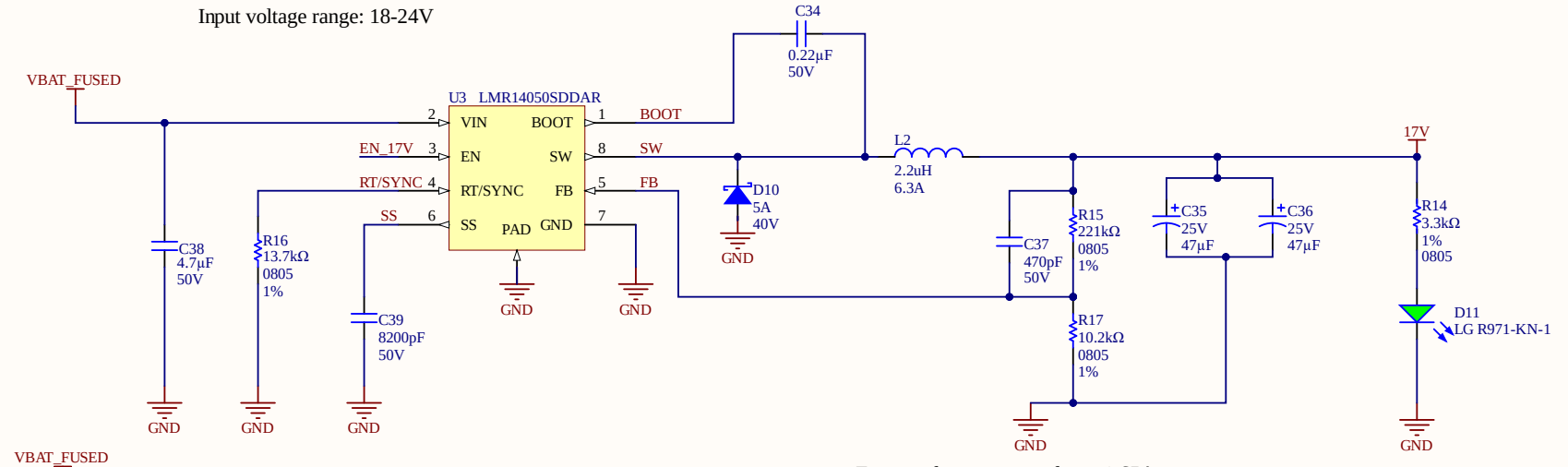


TODO:
- add appropriate test points
- add appropriate comments

Title PDB Rev2 - 24V Buck-Boost Converter		Altium Limited L3, 12a Rodborough Rd Frenchs Forest NSW Australia 2086
Size: Letter	Drawn By: Cindy Li	
Date: 2020-11-02	Sheet 3 of 12	
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH3 - 24V BUCK-BOOST CONVERTER.SchD		

17V Regulator @ 4A Max

Input voltage range: 18-24V

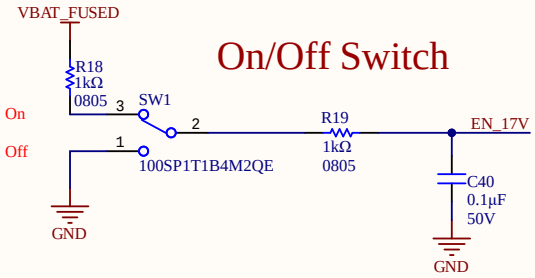


Estimated max current draw: 1.65A
Peak efficiency: 94.8%
Output voltage ripple: 19.45mVpp

LED forward drop = 2.2V

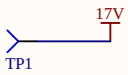
LED current = (17-2.2)/3300 = 4.5mA

On/Off Switch



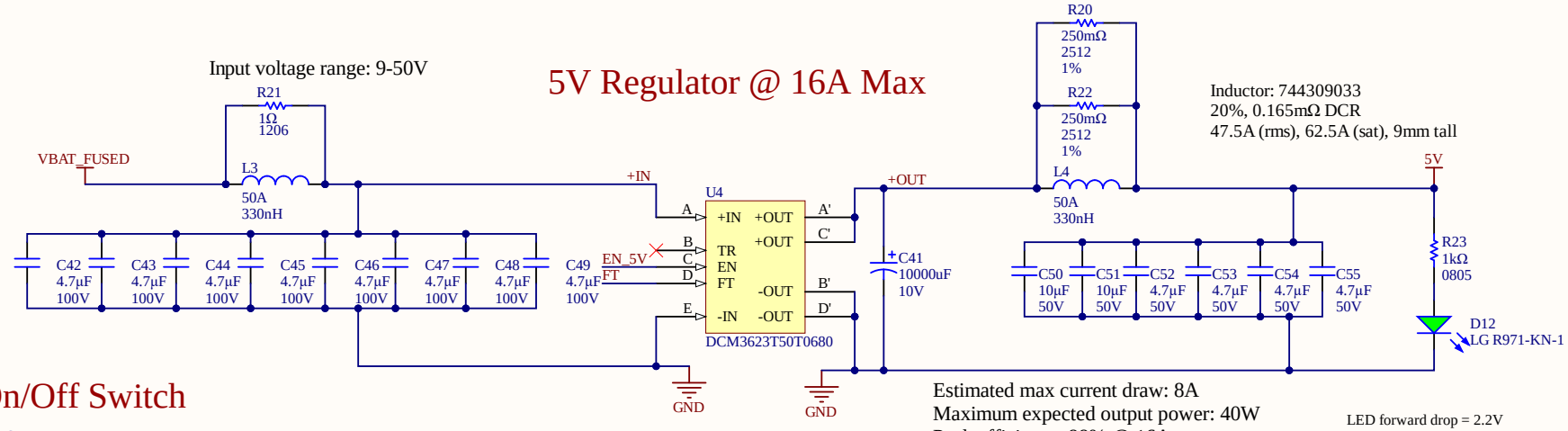
Internally pulled up
Pull below 1.2V to disable.
Float or connect to VIN to enable.
Debounce time: 100k * 0.1µ = 10ms

Test Point



Title Power Distribution Board Rev2 - 17V Buck Converter			Altium Limited 13, 12a Rodborough Rd Frenchs Forest NSW Australia 2086
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 4 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH4 - 17V BUCK CONVERTER.SchDoc			

5V Regulator @ 16A Max

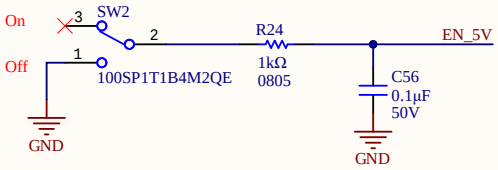


Estimated max current draw: 8A
Maximum expected output power: 40W
Peak efficiency: 88% @ 16A
Output voltage ripple: 277mVpp

LED forward drop = 2.2V

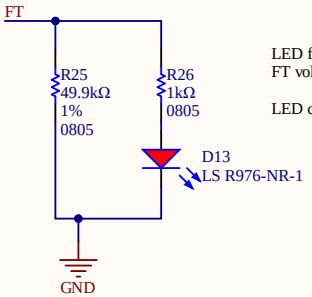
LED current = (5-2.2)/1000 = 2.8mA

On/Off Switch



Internally pulled up to VCC
Debounce time: 100k * 0.1µ = 10ms

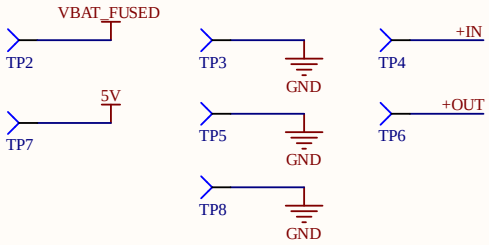
Fault Indicator



LED forward drop = 2.0V
FT voltage = 3.3V (from internally generated VCC)

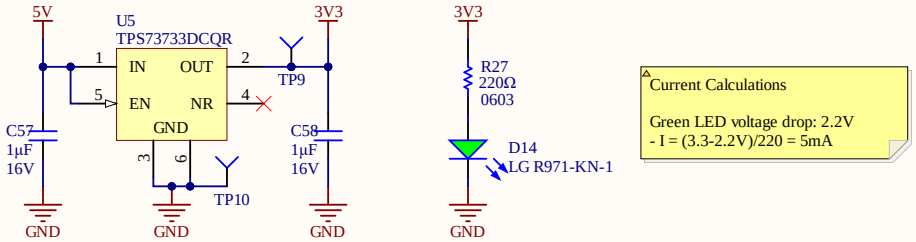
LED current = (3.3-2)/1000 = 1.3mA

Test Points



Title Power Distribution Board Rev2 - 5V Vicor DCDC		Altium Limited L3, 12a Rodborough Rd Frenchs Forest NSW Australia 2086	UW ROBOTICS TEAM
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 5 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH5 - 5V VICOR DCDC.SchDoc			

5V to 3.3V LDO



Title: Power Distribution Board Rev2 - 3.3V Linear Regulator			
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 6 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH6 - 3.3V LINEAR REGULATOR.SchDoc			

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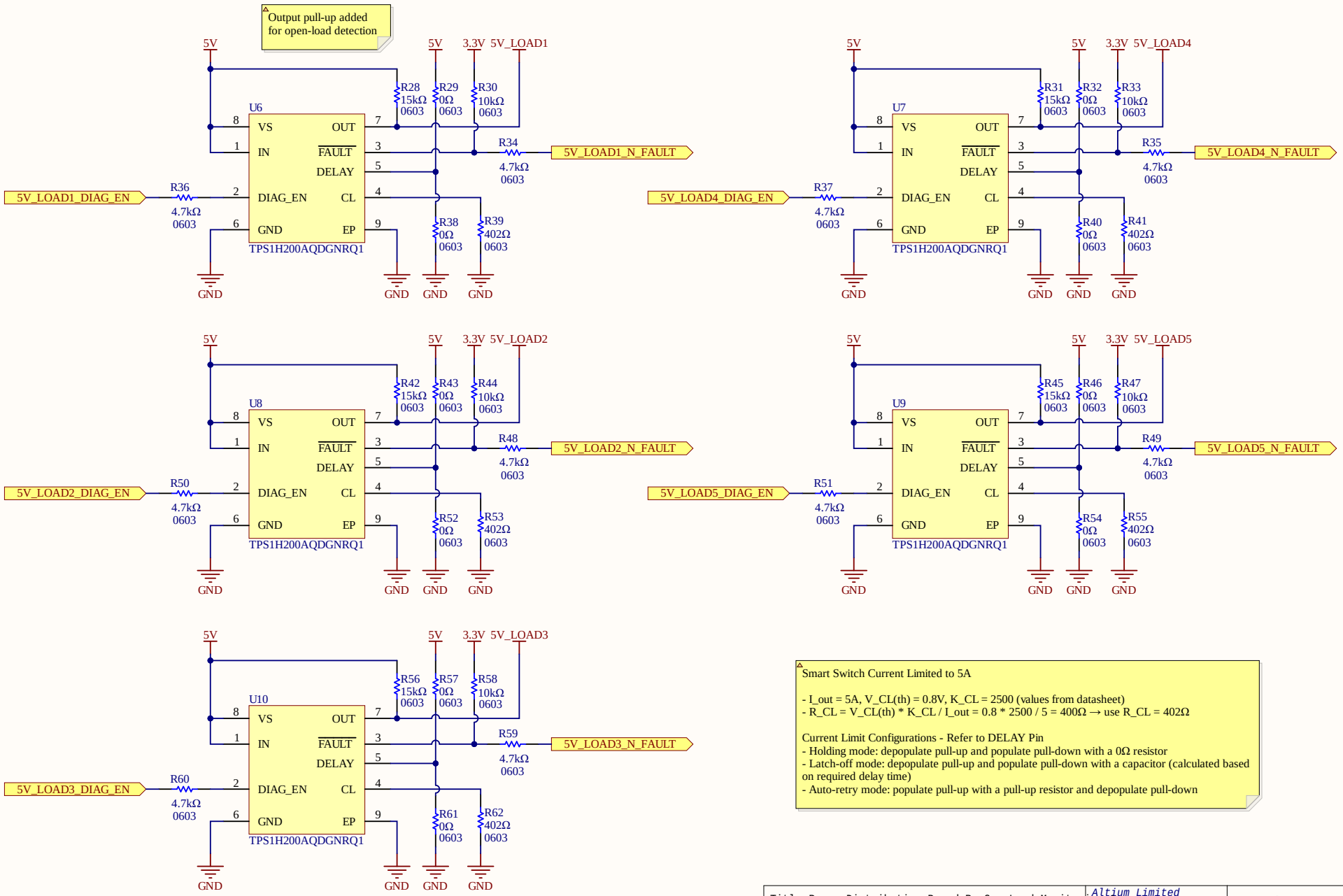
5V Loads Smart Switches



Smart Switch Current Limited to 5A

- I_out = 5A, V_CL(th) = 0.8V, K_CL = 2500 (values from datasheet)
- R_CL = V_CL(th) * K_CL / I_out = 0.8 * 2500 / 5 = 400Ω → use R_CL = 402Ω

Current Limit Configurations - Refer to DELAY Pin
- Holding mode: depopulate pull-up and populate pull-down with a 0Ω resistor
- Latch-off mode: depopulate pull-up and populate pull-down with a capacitor (calculated based on required delay time)
- Auto-retry mode: populate pull-up with a pull-up resistor and depopulate pull-down

Title: Power Distribution Board Rev2 - Load Monitoring 1		Altium Limited 13, 12a Rodborough Rd Frenchs Forest NSW Australia 2086
Size: Letter	Drawn By: Cindy Li	
Date: 2020-11-02	Sheet 7 of 12	
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH7 - LOAD MONITORING 1.SchDoc		

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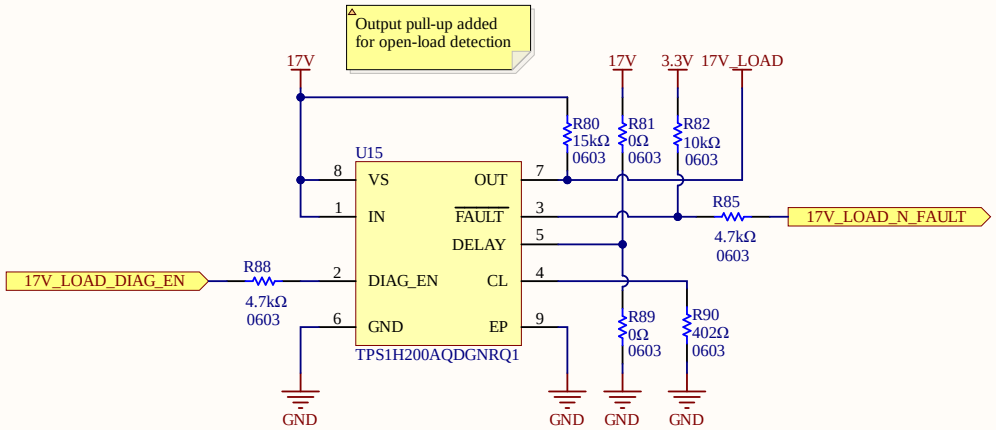
Jetson Smart Switch

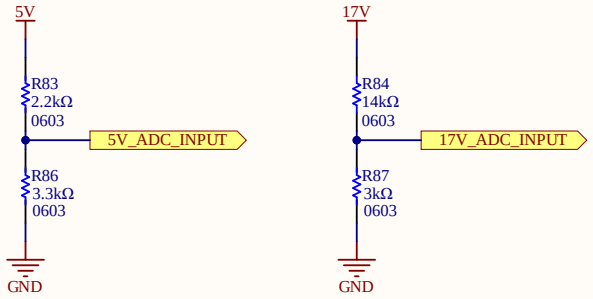


Smart Switch Current Limited to 5A

- I_out = 5A, V_CL(th) = 0.8V, K_CL = 2500 (values from datasheet)
- R_CL = V_CL(th) * K_CL / I_out = 0.8 * 2500 / 5 = 400Ω → use R_CL = 402Ω

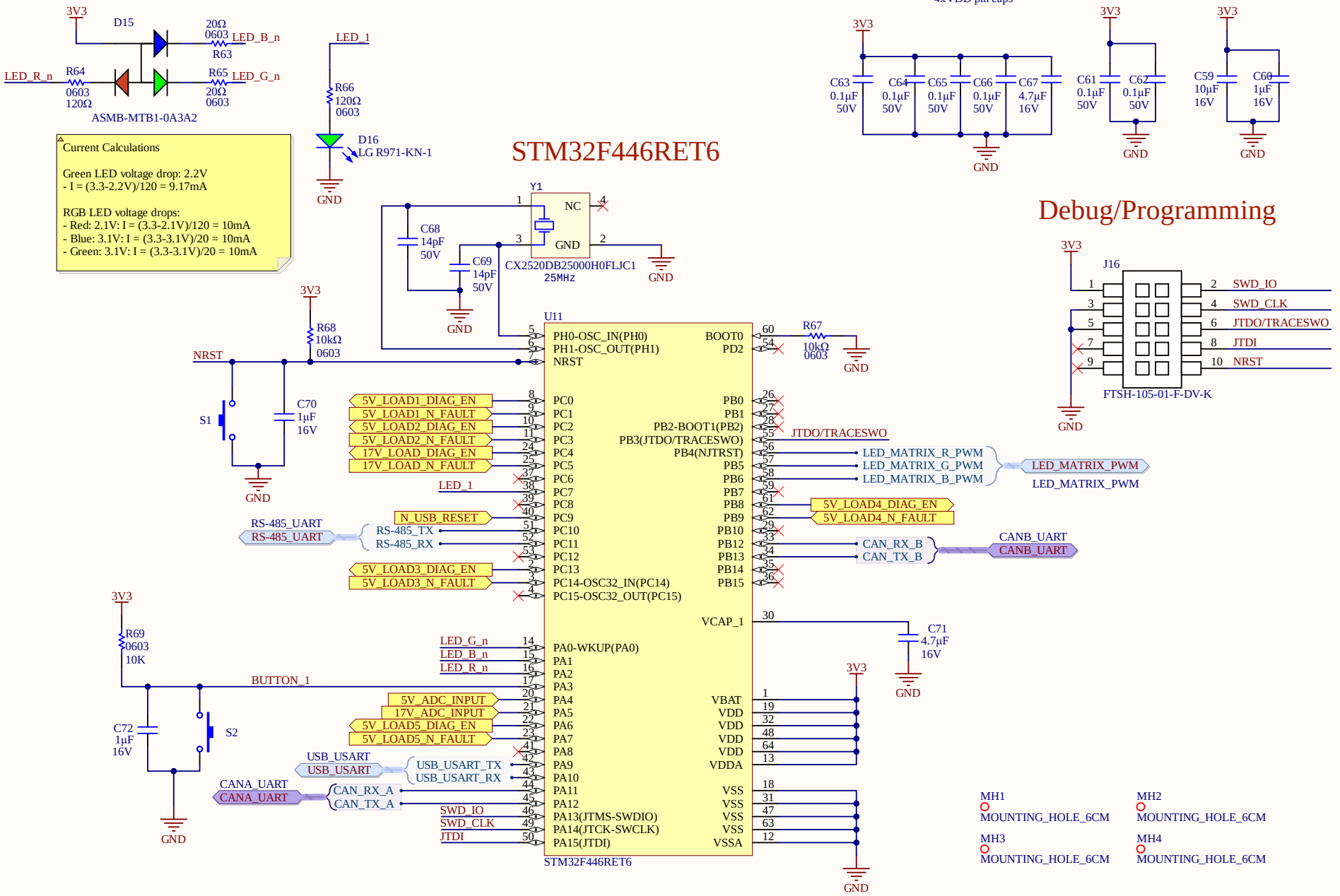
Current Limit Configurations - Refer to DELAY Pin
- Holding mode: depopulate pull-up and populate pull-down with a 0Ω resistor
- Latch-off mode: depopulate pull-up and populate pull-down with a capacitor (calculated based on required delay time)
- Auto-retry mode: populate pull-up with a pull-up resistor and depopulate pull-down

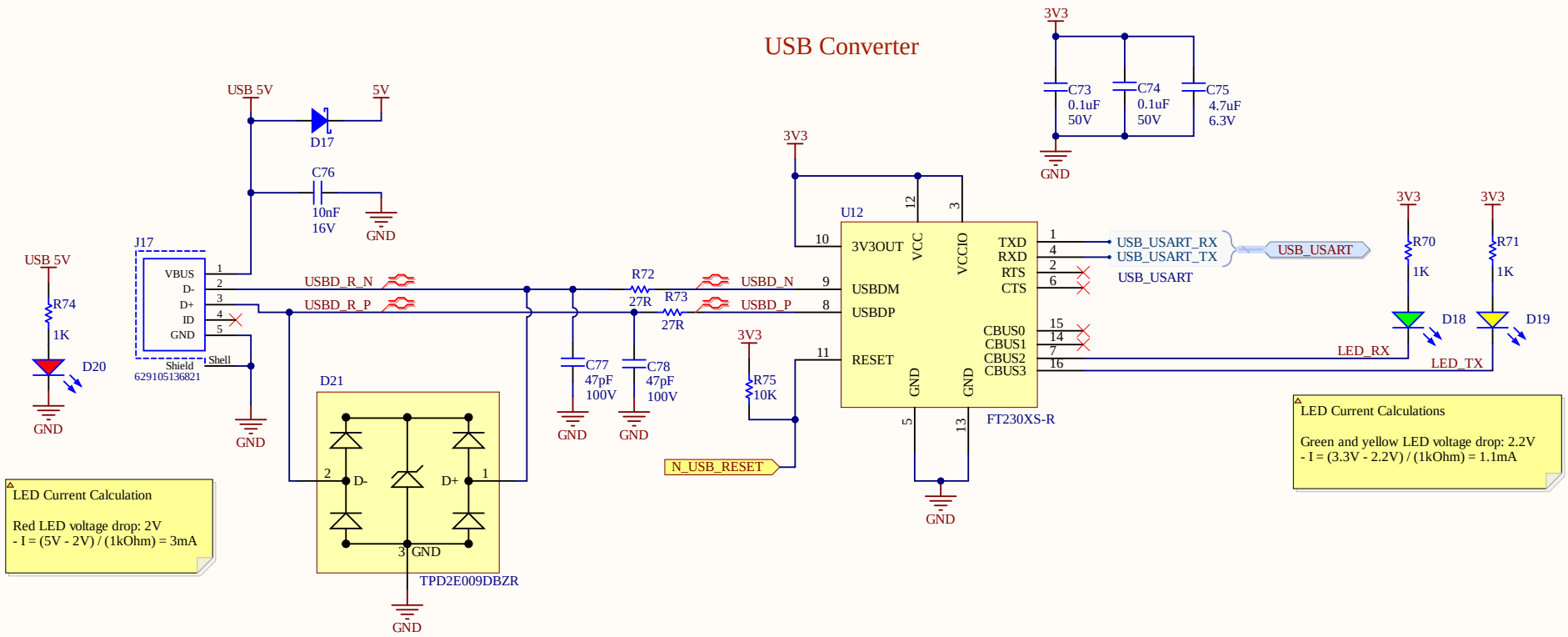
Power Rail Voltage Monitoring



TODO:
- Test points for load voltages?

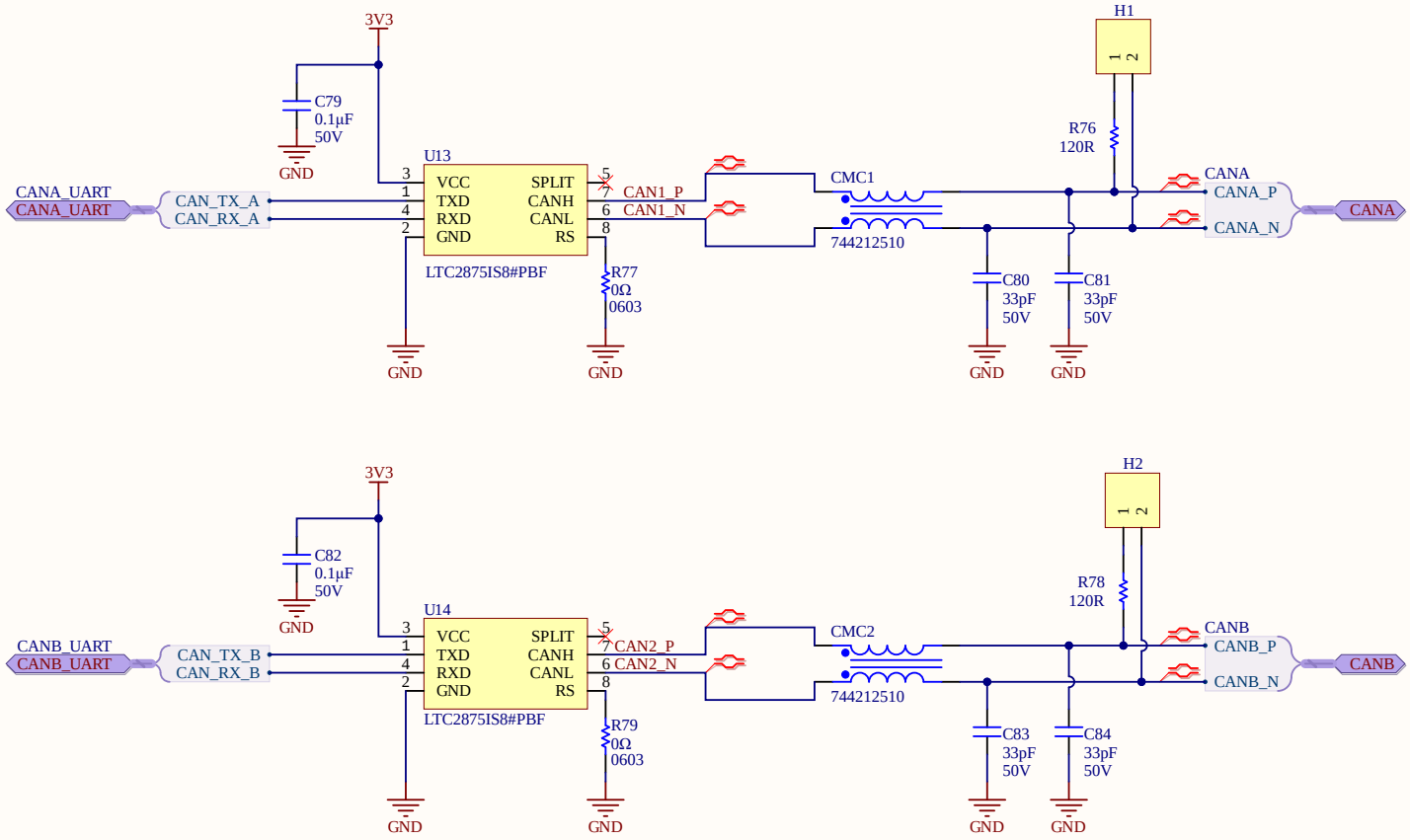
Title: Power Distribution Board Rev2 - Load Monitoring 2			Altium Limited L3, 12a Rodborough Rd Frenchs Forest NSW Australia 2086
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 8 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH8 - LOAD MONITORING 2.SchDoc			


Status/Debug LEDs
3V3
D15
20Ω
0603
LED_B_n
R63
LED_R_n
R64
0603
120Ω
R65
20Ω
0603
LED_G_n
ASMB-MTB1-0A3A2
Current Calculations
Green LED voltage drop: 2.2V
- I = (3.3-2.2V)/120 = 9.17mA
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
LED_1
R66
120Ω
0603
D16
LG R971-KN-1
GND
Decoupling Caps
4xVDD pin caps
VDDIO pin caps
VDDA pin caps
C63
0.1µF
50V
C64
0.1µF
50V
C65
0.1µF
50V
C66
0.1µF
50V
C67
4.7µF
16V
C61
0.1µF
50V
C62
0.1µF
50V
C59
10µF
16V
C60
1µF
16V
STM32F446RET6
Y1
NC
GND
CX2520DB25000H0FLJC1
25MHz
C68
14pF
50V
C69
14pF
50V
U11
PH0-OSC_IN(PH0)
PH1-OSC_OUT(PH1)
NRST
BOOT0
PD2
R67
10kΩ
0603
R68
10kΩ
0603
NRST
S1
C70
1µF
16V
5V_LOAD1_DIAG_EN
5V_LOAD1_N_FAULT
5V_LOAD2_DIAG_EN
5V_LOAD2_N_FAULT
17V_LOAD_DIAG_EN
17V_LOAD_N_FAULT
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PC8
PC9
PC10
PC11
PC12
PC13
PC14-OSC32_IN(PC14)
PC15-OSC32_OUT(PC15)
PB0
PB1
PB2-BOOT1(PB2)
PB3(JTDO/TRACESWO)
PB4(NJTRST)
PB5
PB6
PB7
PB8
PB9
PB10
PB12
PB13
PB14
PB15
JTDO/TRACESWO
LED_MATRIX_R_PWM
LED_MATRIX_G_PWM
LED_MATRIX_B_PWM
LED_MATRIX_PWM
5V_LOAD4_DIAG_EN
5V_LOAD4_N_FAULT
CAN_RX_B
CAN_TX_B
CANB_UART
N_USB_RESET
RS-485_UART
RS-485_TX
RS-485_RX
5V_LOAD3_DIAG_EN
5V_LOAD3_N_FAULT
VCAP_1
C71
4.7µF
16V
Debug/Programming
J16
SWD_IO
SWD_CLK
JTDO/TRACESWO
JTDI
NRST
FTSH-105-01-F-DV-K
R69
0603
10K
BUTTON_1
S2
C72
1µF
16V
LED_G_n
LED_B_n
LED_R_n
PA0-WKUP(PA0)
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PA8
PA9
PA10
PA11
PA12
PA13(JTMS-SWDIO)
PA14(JTCK-SWCLK)
PA15(JTDI)
5V_ADC_INPUT
17V_ADC_INPUT
5V_LOAD5_DIAG_EN
5V_LOAD5_N_FAULT
USB_USART
USB_USART_TX
USB_USART_RX
CANA_UART
CAN_RX_A
CAN_TX_A
SWD_IO
SWD_CLK
JTDI
VBAT
VDD
VDD
VDD
VDD
VDDA
VSS
VSS
VSS
VSS
VSSA
MH1
MOUNTING_HOLE_6CM
MH2
MOUNTING_HOLE_6CM
MH3
MOUNTING_HOLE_6CM
MH4
MOUNTING_HOLE_6CM
Title Power Distribution Board Rev2 - MCU
Size: Letter
Drawn By: Cindy Li
Date: 2020-11-02
Sheet 9 of 12
Altium Limited
L3, 12a Rodborough Rd
Frenchs Forest
NSW
Australia 2086
UW ROBOTICS TEAM
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH9 - MICROCONTROLLER.SchDoc



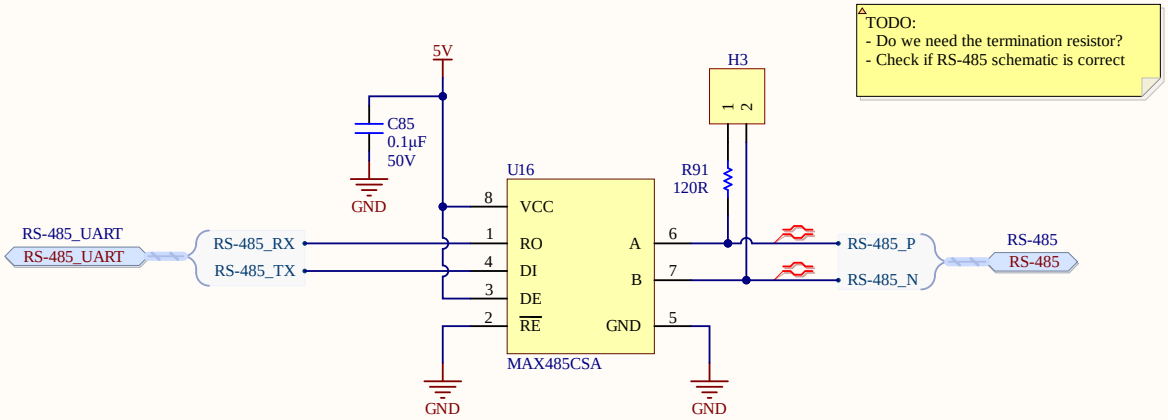
Title Power Distribution Board Rev2 - USB		Altium Limited L3, 12a Rodborough Rd Frenchs Forest NSW Australia 2086	UW ROBOTICS TEAM
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 10 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH10 - USB.SchDoc			

CAN Transceivers



Title Power Distribution Board Rev2 - CAN Transceivers			Altium Limited 13, 12a Rodborough Rd Frenchs Forest NSW Australia 2086
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 11 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH11 - CAN.SchDoc			

RS-485 Transceiver



Title Power Distribution Board Rev2 - RS-485			Altium Limited L3, 12a Rodborough Rd Frenchs Forest NSW Australia 2086
Size: Letter	Drawn By: Cindy Li		
Date: 2020-11-02	Sheet 12 of 12		
File: C:\UWRT\MarsRover2021-hardware\Projects\Power Distribution Board\Rev2\SH12 - RS-485.SchDoc			

Comment	Description	Designator	Footprint	LibRef	Quantity
CAP_100pF_0603	CAP CER 100PF 50V C0G/NP0 0603	C1, C32	CAP0603	CAP_100pF_0603	2
CAP_270uF_50V_ALUM	CAP ALUM 270UF 20% 50V RADIAL	C2	RADIAL_PANASONIC_G	CAP_270uF_50V_ALUM	1
CAP_2.2uF_25V_0805	CAP CER 2.2UF 25V X7R 0805	C3	CAP2012	CAP_2.2uF_25V_0805	1
0.1µF	CAP CER 0.1UF 50V X7R 0805	C4, C5, C6, C7, C8, C9, C10, C40, C56	CAPC2012X140N	CAP_0.1uF_50V_0805	9
CAP_39uF_35V_ALUM	CAP ALUM POLY 39UF 20% 35V SMD	C11	RADIAL_PANASONIC_E7	CAP_39uF_35V_ALUM	1
CAP_10uF_50V_1210	CAP CER 10UF 50V X7R 1210	C12, C13, C14, C22, C23, C24	CAP1210	CAP_10uF_50V_1210	6
CAP_68uF_35V_ALUM	CAP ALUM 68UF 20% 35V SMD	C15	RADIAL_NICHION_1V	CAP_68uF_35V_ALUM	1
CAP_10uF_50V_1210_TDK	CAP CER 10UF 50V X7R 1210	C16, C17	CAP1210	CAP_10uF_50V_1210_TDK	2
CAP_10uF_50V_2220	CAP CER 10UF 100V X7S 2220	C18, C19, C20	C5750X7S2A106M230KB	CAP_10uF_50V_2220	3
CAP_0.22uF_50V_0603	CAP CER 0.22UF 50V X7R 0603	C21	CAP0603	CAP_0.22uF_50V_0603	1
CAP_33pF_50V_0805	CAP CER 33PF 50V C0G/NP0 0805	C25	CAP2012	CAP_33pF_50V_0805	1
CAP_1uF_50V_0603	CAP CER 1UF 50V X6S 0603	C26, C28	CAP0603	CAP_1uF_50V_0603	2
CAP_47pF_100V_0603	CAP CER 47PF 100V C0G/NP0 0603	C27	CAP0603	CAP_47pF_100V_0603	1
5600pF	CAP CER 5600PF 50V C0G 0805	C29	CAP2012	CAP_5600pF_50V_0805	1
0.1µF	CAP CER 0.1UF 50V X7R 0805	C30, C31	CAP2012	CAP_0.1uF_50V_0805	2
0.022µF	CAP CER 0.022UF 50V C0G 0805	C33	CAP2012	CAP_0.022uF_50V_0805	1
GRM21BR71H224MA01L	CAP CER 0.22UF 50V X7R 0805	C34	CAP 0805_2012	GRM21BR71H224MA01L	1
47µF	CAP ALUM POLY 47UF 20% 25V SMD	C35, C36	25SVPF47M	25SVPF47M	2
470pF	CAP CER 470PF 50V X7R 0805	C37	CAP 0805_2012	CAP_470pF_50V_0805	1
GRM31CR71H475KA12L	CAP CER 4.7UF 50V X7R 1206	C38	CAPC1206(3216)	GRM31CR71H475KA12L	1
8200pF	CAP CER 8200PF 50V X7R 0805	C39	CAP 0805_2012	CAP_8200pF_50V_0805	1
URS1A103MHD1TN	CAP ALUM 10000UF 20% 10V RADIAL	C41	CAP_UBY_18X25_NC	URS1A103MHD1TN	1
4.7µF	CAP CER 4.7UF 100V X7R 2220	C42, C43, C44, C45, C46, C47, C48, C49	CAPC5750X7R2A	CAP_4.7uF_100V_2220	8
10uF	CAP CER 10UF 50V X5R 1206	C50, C51	CAPC1206(3216)	CAP_10uF_50V_1206	2
4.7µF	CAP CER 4.7UF 50V X7R 1206	C52, C53, C54, C55	CAPC1206(3216)	CAP_4.7µF_50V_1206	4
CAP_1uF_16V_0603	CAP CER 1UF 16V Y5V 0603	C57, C58, C60	CAP0603	CAP_1uF_16V_0603	3
CAP_10nF_0603	CAP CER 10000PF 16V X7R 0603	C59	CAP0603	CAP_10nF_0603	1
CAP_0.1uF_50V_0603	CAP CER 0.1UF 50V X7R 0603	C61, C62, C63, C64, C65, C66, C79, C82, C85	CAP0603	CAP_0.1uF_50V_0603	9
CAP_4.7uF_16V_0805	CAP CER 4.7UF 16V X5R 0805	C67, C71	CAP2012	CAP_4.7uF_16V_0805	2
CL10C140JB8NNNC	Cap Ceramic 14pF 50V C0G 5% SMD 0603 125C Cardboard T/R	C68, C69	CAPC0603(1608)55_N	CL10C140JB8NNNC	2
CAP_1uF_16V_0805	CAP CER 1UF 16V X7R 0805	C70, C72	CAP2012	CAP_1uF_16V_0805	2
CAP_0.1uF_50V_0805	CAP CER 0.1UF 50V X7R 0805	C73, C74	CAPC2012X140N	CAP_0.1uF_50V_0805	2
CAP_4.7uF_0603	CAP CER 4.7UF 6.3V X5R 0603	C75	CAPC0603(1608)55_N	CAP_4.7uF_0603	1
CAP_10nF_0603	CAP CER 10000PF 16V X7R 0603	C76	CAPC0603(1608)55_N	CAP_10nF_0603	1
CAP_47pF_100V_0603	CAP CER 47PF 100V C0G/NP0 0603	C77, C78	CAPC1608X87N	CAP_47pF_100V_0603	2
CAP_33pF_50V_0603	CAP CER 33PF 50V C0G/NP0	C80, C81, C83, C84	CAP0603	CAP_33pF_50V_0603	4
CMC_51uH	CMC 51uH 300MA 2LN SMD	CMC1, CMC2	744212510	CMC_51uH	2
SMAJ22A-E3/61	TVS DIODE 22V 35.5VC SMA	D1	DO-214AC_UNI	SMAJ22A-E3/61	1
LG R971-KN-1	LED GREEN DIFFUSED 0805 SMD	D2, D11, D12	LED_0805_LINE	DIO_LED_G	3
TVS_DIODE_CAN	TVS DIODE 24V 41V SOT323-3	D3, D4	TVS_DIODE_CAN	TVS_DIODE_CAN	2
DIO_SCHOTTKY_40V_520mA	DIODE SCHOTTKY 40V 520MA SOD323	D5, D7	SOD-323	DIO_SCHOTTKY_40V_520mA	2
DIO_SCHOTTKY_30V_2A	DIODE SCHOTTKY 30V 2A PMDTM	D6, D8, D9	SOD-128	DIO_SCHOTTKY_30V_2A	3
B540C-13-F	DIODE SCHOTTKY 40V 5A SMC	D10	DO214AB SMC	B540C-13-F	1
LS R976-NR-1	LED RED DIFFUSED 0805 SMD	D13	LED_0805_LINE	DIO_LED_R	1
LG R971-KN-1	LED GREEN DIFFUSED 0805 SMD	D14, D16	LED_0805_GREEN	DIO_LED_G	2
LED_RGB	LED RGB DIFFUSED 4PLCC SMD	D15	LED_RGB	LED_RGB	1
DIO_SCHOTTKY_30V_800mA	DIODE SCHOTTKY 30V 800MA USC	D17	SOD-323_UNIDIR	DIO_SCHOTTKY_30V_800mA	1
DIO_LED_G	LED GREEN DIFFUSED 0805 SMD	D18	LED_0805_LINE	DIO_LED_G	1
DIO_LED_Y	LED YELLOW DIFFUSED 0805 SMD	D19	LED_0805_LINE	DIO_LED_Y	1
DIO_LED_R	LED RED DIFFUSED 0805 SMD	D20	LED_0805_LINE	DIO_LED_R	1
TVS_DIODE_USB_5.5V	ESD Suppressor Diode Arrays 8KV 3-Pin SOT-23 T/R	D21	SOT23-3	TVS_DIODE_USB_5.5V	1
0324015.HXP	FUSE CERM 15A 250VAC 125VDC 3AB	F1	FUSE	0324015.HXP	1
FUSE_250mA_0603	FUSE SMD 250mA 32V	F2, F3, F4, F5	FUSE_0603	FUSE_250mA_0603	4
JUMPER_2	HEADER 2X1	H1, H2, H3	HDR1X2	JUMPER_2	3
1935161	TERM BLK 2POS SIDE ENTRY 5MM	J1, J4, J8, J9, J10, J11, J14, J15	1935161	CON_2M_TERM	8
CON_6M_SM_RA_1.5mm	CONN HEADER SMD RIGHT ANGLE 1.5 MM PITCH	J2, J5	MOLEX-5025850670	CON_6M_SM_RA_1.5mm	2
CON_4M_SM_RA	CONN HEADER SMD RIGHT ANGLE 1.5 MM PITCH	J3, J6, J7, J12, J13	MOLEX-5025850470	CON_4M_SM_RA	5
CON_PROGRAMMING	Board Connector, 10 Contact(s), 2 Row(s), Male, Straight, 0.05 inch Pitch, Surface Mount Terminal, Locking	J16	FTSH-105-01-F-DV-K-PTR	CON_PROGRAMMING	1
629105136821	Micro USB 2.0 Type B Receptacle WR-COM, Horizontal, SMT, with Pads and Pegs	J17	629105136821	WE 629105136821	1
IND_2.2uH_9A	FIXED IND 2.2UH 9A 6 MOHM SMD	L1	IND_BOURNS_SDR1307	IND_2.2uH_9A	1
SRN8040-2R2Y	FIXED IND 2.2UH 6.3A 13 MOHM SMD	L2	IND_BOURNS_SRN80	SRN8040-2R2Y	1
744309033	IND 330NH 47.5A 0.165 MOHM	L3, L4	WE-HCM 1390	744309033	2
MOUNTING_HOLE_6CM	MOUNTING_HOLE_6CM	MH1, MH2, MH3, MH4	MOUNTING_HOLE	MOUNTING_HOLE_6CM	4
NMOS_40V_100A	N-Channel 40V 100A 188W Surface Mount PG-TDSON-8-6	Q1	TRANS_BSC007N04LS6ATMA1	NMOS_40V_100A	1
CSD19538Q2	MOSFET NCH 100V 14.4A SON	Q2, Q4, Q5	TRANS_CSD19538Q2	CSD19538Q2	3
CSD17571Q2	MOSFET N-CH 30V 22A 6SON	Q3	TRANS_CSD19538Q2	CSD17571Q2	1
RES_4.7kΩ_0805	RES SMD 4.7K OHM 5% 1/8W 0805	R1	RESC2012X60N	RES_4.7kΩ_0805	1
RES_576kΩ_0603	RES SMD 576K OHM 1% 1/10W 0603	R2	RESC0603(1608)_N	RES_576kΩ_0603	1
RES_249kΩ_0603	RES 249K OHM 1% 1/10W 0603	R3	RESC0603(1608)_N	RES_249kΩ_0603	1
RES_10Ω_0603	RES SMD 10 OHM 1% 1/10W 0603	R4	RESC0603(1608)_N	RES_10Ω_0603	1
RES_20kΩ_0603	RES SMD 20K OHM 1% 1/10W 0603	R5, R9	RESC0603(1608)_N	RES_20kΩ_0603	2
RES_18.7kΩ_0603_1%	RES SMD 18.7K OHM 1% 1/10W 0603	R6	RESC0603(1608)_N	RES_18.7kΩ_0603_1%	1
RES_16mΩ_1206	RES 0.016 OHM 1W 1206 WIDE	R7	RESC1632X60N	RES_16mΩ_1206	1
RES_100Ω_0603	RES SMD 100 OHM 1% 1/10W 0603	R8, R12	RESC0603(1608)_N	RES_100Ω_0603	2
RES_26.7kΩ_0603	RES SMD 26.7K OHM 1% 1/10W 0603	R10	RESC0603(1608)_N	RES_26.7kΩ_0603	1
RES_93.1kΩ_0603	RES SMD 93.1K OHM 1% 1/10W 0603	R11	RESC0603(1608)_N	RES_93.1kΩ_0603	1
RES_73.2kΩ_0603	RES SMD 73.2K OHM 1% 1/16W 0603	R13	RESC0603(1608)_N	RES_73.2kΩ_0603	1
3.3kΩ	RES SMD 3.3K OHM 1% 1/8W 0805	R14	RESC2012X60N	RES_3.3kΩ_0805	1
221kΩ	RES SMD 221K OHM 1% 1/8W 0805	R15	RESC2012X60N	RES_221kΩ_0805	1
13.7kΩ	RES SMD 13.7K OHM 1% 1/8W 0805	R16	RESC2012X60N	RES_13.7kΩ_0805	1
10.2kΩ	RES SMD 10.2K OHM 1% 1/8W 0805	R17	RESC2012X60N	RES_10.2kΩ_0805	1
1kΩ	RES SMD 1K OHM 1% 1/8W 0805, RES SMD 100K OHM 0.5% 1/8W 0805	R18, R19, R23, R24, R26	RESC2012X60N	RES_1kΩ_0805, RES_100kΩ_0805	5
WSL2512R2500FEA	RES 0.25 OHM 1% 1W 2512	R20, R22	RESC6432X89X76NL25T25	RES_250mΩ_2512	2
RES_1Ω_1206	RES 1 OHM 5% 1/4W 1206	R21	RESC1206(3216)_N	RES_1Ω_1206	1
49.9kΩ	RES SMD 49.9K OHM 1% 1/8W 0805	R25	RESC2012X60N	RES_49.9kΩ_0805	1
RES_220Ω_0603	RES SMD 220 OHM 5% 1/10W 0603	R27	RESC0603(1608)_N	RES_220Ω_0603	1
RES_15kΩ_0603	RES SMD 15K OHM 5% 1/10W 0603	R28, R31, R42, R45, R56, R80	RESC0603(1608)_N	RES_15kΩ_0603	6
RES_0Ω_0603	RES SMD 0 OHM JUMPER 1/10W 0603	R29, R32, R38, R40, R43, R46, R52, R54, R57, R61, R77, R79, R81, R89	RESC0603(1608)_N	RES_0Ω_0603	14
RES_10kΩ_0603	RES SMD 10K OHM 5% 1/10W 0603	R30, R33, R44, R47, R58, R67, R68, R82	RESC0603(1608)_N	RES_10kΩ_0603	8
RES_4.7kΩ_0603	RES SMD 4.7K OHM 5% 1/10W 0603	R34, R35, R36, R37, R48, R49, R50, R51, R59, R60, R85, R88	RESC0603(1608)_N	RES_4.7kΩ_0603	12
RES_402Ω_0603	RES SMD 402 OHM 0.5% 1/10W 0603	R39, R41, R53, R55, R62, R90	RESC0603(1608)_N	RES_402Ω_0603	6
RES_20Ω_0603	RES SMD 20 OHM 5% 1/10W 0603	R63, R65	RESC0603(1608)_N	RES_20Ω_0603	2
RES_120Ω_0603	RES SMD 120 OHM 5% 1/10W 0603	R64, R66	RESC0603(1608)_N	RES_120Ω_0603	2
RES_10K_0603	RES SMD 10K OHM 5% 1/10W 0603	R69, R75	RESC0603(1608)_N	RES_10K_0603	2
RES_1K_0603	RES SMD 1K OHM 5% 1/10W 0603	R70, R71, R74	RESC0603(1608)_N	RES_1K_0603	3
RES_27R_0603	RES SMD 27 OHM 5% 1/10W 0603	R72, R73	RESC0603(1608)_N	RES_27R_0603	2
RES_120R_0603	RES SMD 120 OHM 5% 1/10W 0603	R76, R78, R91	RESC0603(1608)_N	RES_120R_0603	3
RES_2.2kΩ_0603	RES SMD 2.2K OHM 1% 1/10W 0603	R83	RESC0603(1608)_N	RES_2.2kΩ_0603	1
RES_14kΩ_0603	RES SMD 14K OHM 1% 1/10W 0603	R84	RESC0603(1608)_N	RES_14kΩ_0603	1
RES_3.3kΩ_0603	RES SMD 3.3K OHM 5% 1/10W 0603	R86	RESC0603(1608)_N	RES_3.3kΩ_0603	1
RES_3kΩ_0603	RES SMD 3K OHM 1% 1/10W 0603	R87	RESC0603(1608)_N	RES_3kΩ_0603	1
SW_TACTILE	Tactile Switch (Grey)	S1, S2	B3U-1000P	SW_TACTILE	2
100SP1T1B4M2QE	SWITCH TOGGLE SPDT 5A 120V	SW1, SW2	100SP1T1B4M2QE	SW_SPDT	2
TESTPOINT_SMD_LOOP	PC TEST POINT SMD	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10	S1751-46R	TESTPOINT_SMD_LOOP	10
LM74610QDGKRQ1	IC SMART DIODE CTLR 8VSSOP	U1	SOP65P490X110-8N	LM74610QDGKRQ1	1
LM5175PWPR	IC REG CTRLR BUCK-BOOST 28HTSSOP	U2	IC_TPS61196PWPRQ1	LM5175PWPR	1
LMR14050SDDAR	IC REG BUCK ADJUSTABLE 5A 8SOPWR	U3	8-PowerSOIC	LMR14050SDDAR	1
DCM3623T50T0680	DC DC CONVERTER 5V 80W	U4	DCM3623T50T0680	DCM3623T50T0680	1
TPS73733DCQR	IC REG LINEAR 3.3V 1A SOT223-6	U5	SOT-223-6	LDO_3.3V_1A	1
TPS1H200A-Q1	IC PWR DRIVER N-CHAN 1:1 8MSOP	U6, U7, U8, U9, U10, U15	DGN0008G	TPS1H200A-Q1	6
STM32F446RET6	ARM Cortex-M4 32-bit MCU+FPU, 512 KB Flash, 128 KB Internal RAM, 50 I/Os, 64-Pin LQFP, -40 to 85 degC, Tray	U11	STM-LQFP64_L	MCU_STM32F446RET6	1
IC_USB_TRANSCEIVER		U12	SSOP16-0.635-5X4MM	IC_USB_TRANSCEIVER	1
IC TXRX CAN	IC TXRX CAN 4MBPS 8SO	U13, U14	LT-S8_N	LTC2875	2
MAX485CSA	1/1 Transceiver Half RS422, RS485 8-SOIC	U16	SOIC127P600X175-8N	MAX485CSA	1
CRYSTAL_25MHZ	CRYSTAL 25.0000MHZ 12PF SMD	Y1	SOIC254P1016X440-4N	CRYSTAL_25MHZ	1