

# Root

## Quadcopter

SCHEMATIC STATUS: **PRELIMINARY**

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01  
2024-03-17  
VARIANT: N/A

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### TEMPLATE NOTES

#### Set Project Parameters

- 1 Go to View -> Pge Preview Setting
- 2 Set Parameters based on the following Info  
COMMENT 1: Project Version  
COMMENT 2: Document Status  
COMMENT 3: Doc. Approval Eng.  
COMMENT 4: BOM Ref. DOC.  
COMMENT 5: PCB Ref. DOC.  
COMMENT 6: GBR Ref. DOC.  
COMMENT 7: ASM Ref. DOC.  
COMMENT 8: Variant Name  
COMMENT 9: Revision Description

#### Symbols and Labels

Mark Not Fitted Components as --> **DNF**  
Differential Signal Example  
Net Class Example

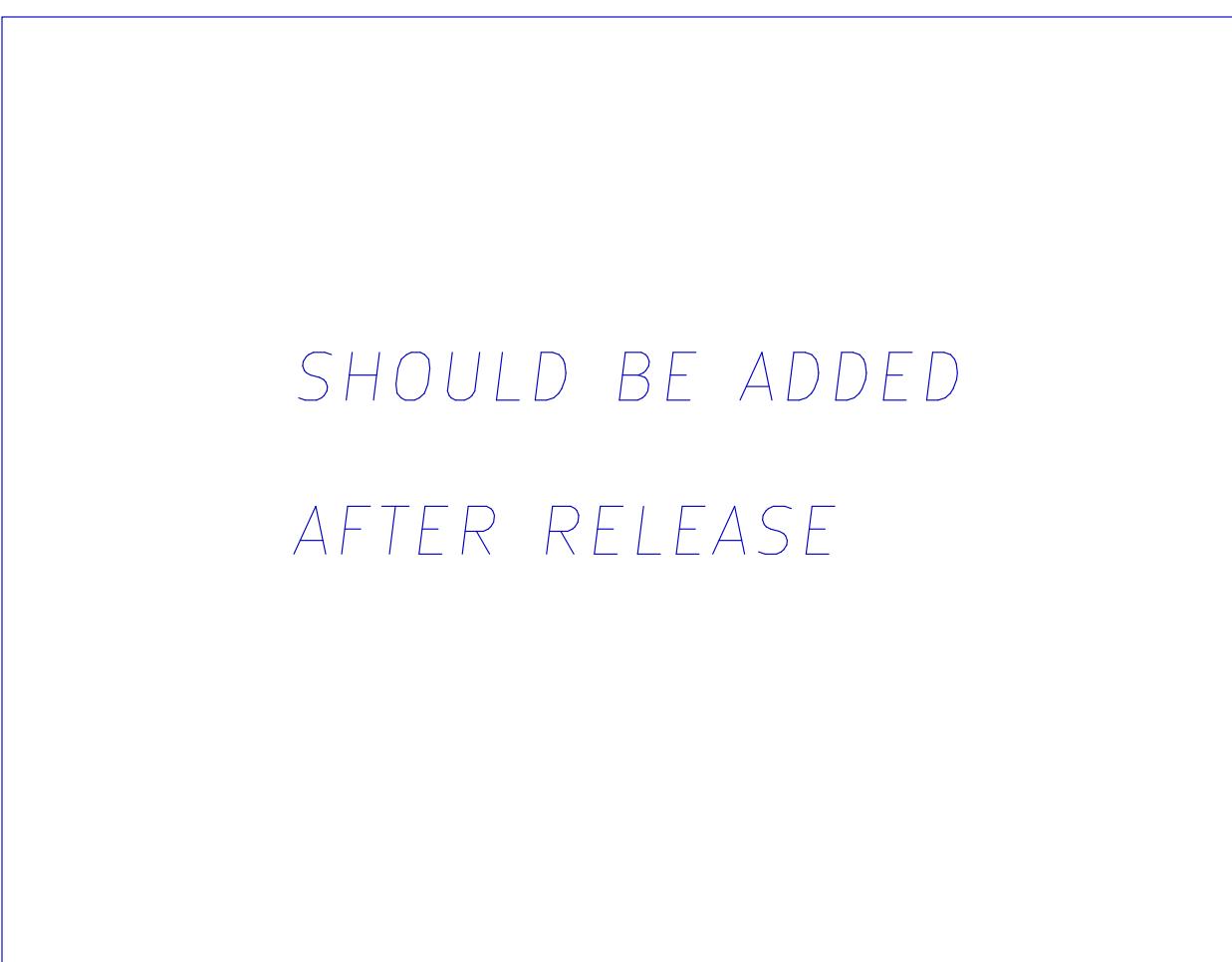
#### SCHEMATIC STATUS:

- |             |   |
|-------------|---|
| DRAFT       | Very Early Stage of Schematic                 |
| PRELIMINARY | Close to Final Schematic                      |
| CHECKED     | There Should Not Be Any Mistakes              |
| RELEASED    | A Board with This Schematic Has Been Produced |

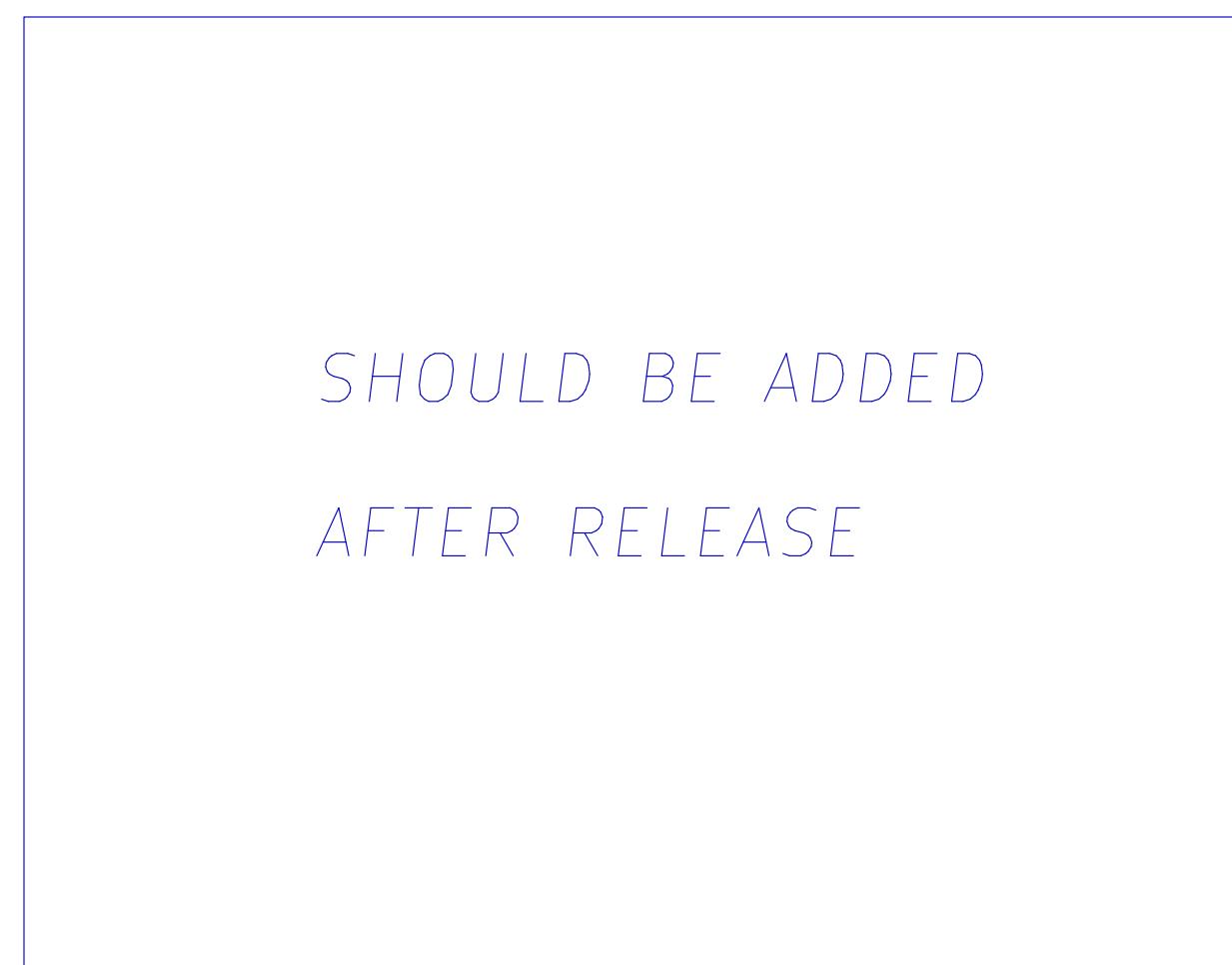
#### DESIGN CONSIDERATION

<b>INFO:</b> Example text for informational design notes.	<b>CAUTIONARY:</b> Example text for cautionary design notes.	<b>DESIGN NOTE:</b> Example text for critical design notes.	<b>LAYOUT NOTE:</b> Example text for critical layout guidelines.
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### 3D Preview TOP



### 3D Preview BOTTOM



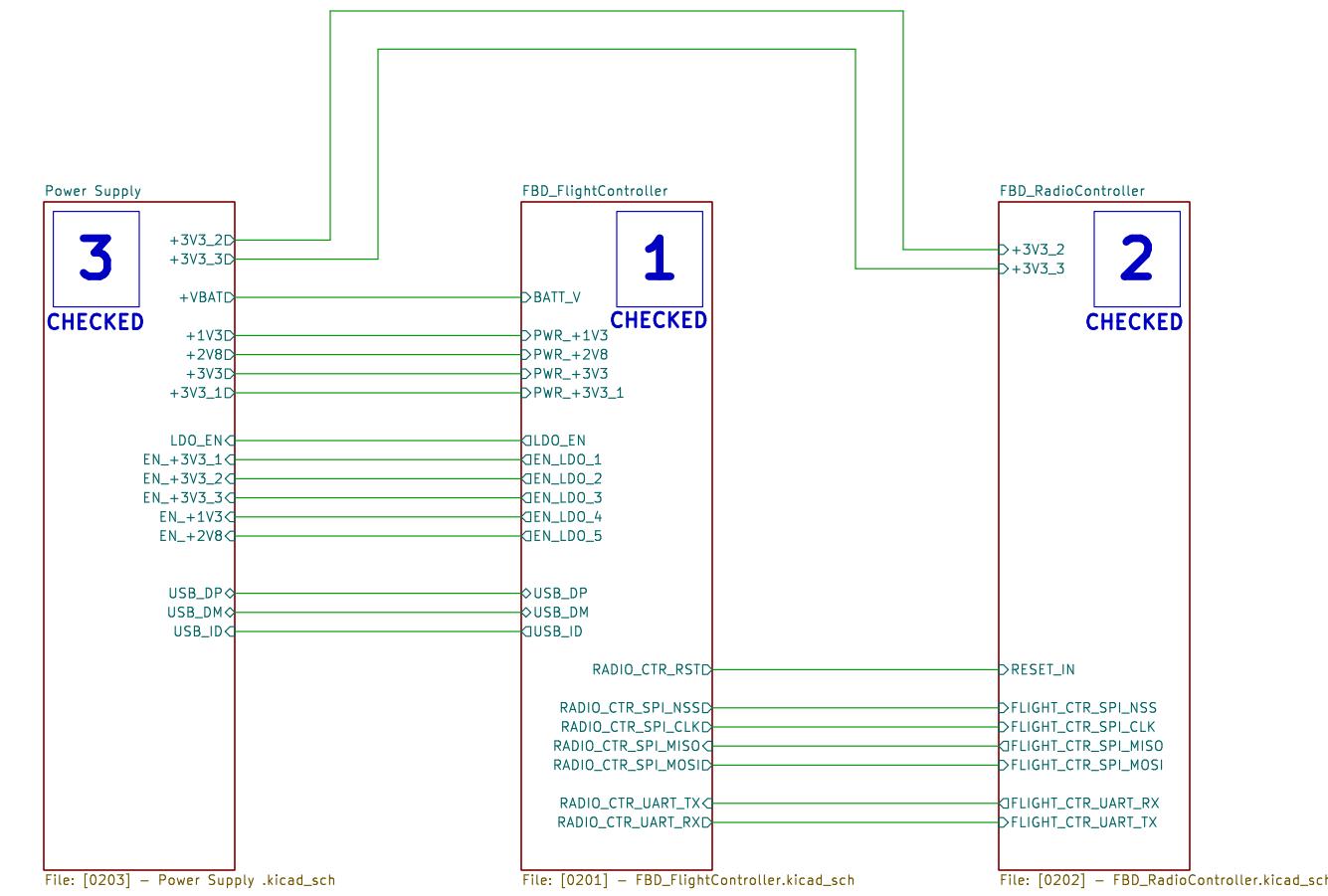
### Board Statistics Stackup Info

SHOULD BE ADDED  
AFTER RELEASE

APPROVALS		DATE	PROJECT:		
ENG: Siavash Taher Parvar		2024-03-17	Quadcopper		
DSN: Siavash Taher Parvar		2024-03-17			
CHK: Siavash Taher Parvar		2024-03-17	PRJ VER: 01	DOC VER: 01	DOC REV: 01
REFERENCE DOCUMENTS		TITLE:			Mendozo
SCH Ref. DOC.: Sub_HW_Qcopper.kicad_sch		Root			OPEN-SOURCE DOCUMENT
BOM Ref. DOC.:		FILE NAME: _Sub_HW_Qcopper.kicad_sch			
PCB Ref. DOC.:		SHEET 1 OF 40			SIZE: C
GBR Ref. DOC.:		SCALE: 1:1			VARIANT NAME: N/A
ASM Ref. DOC.:					

# FBD\_Quadcopter

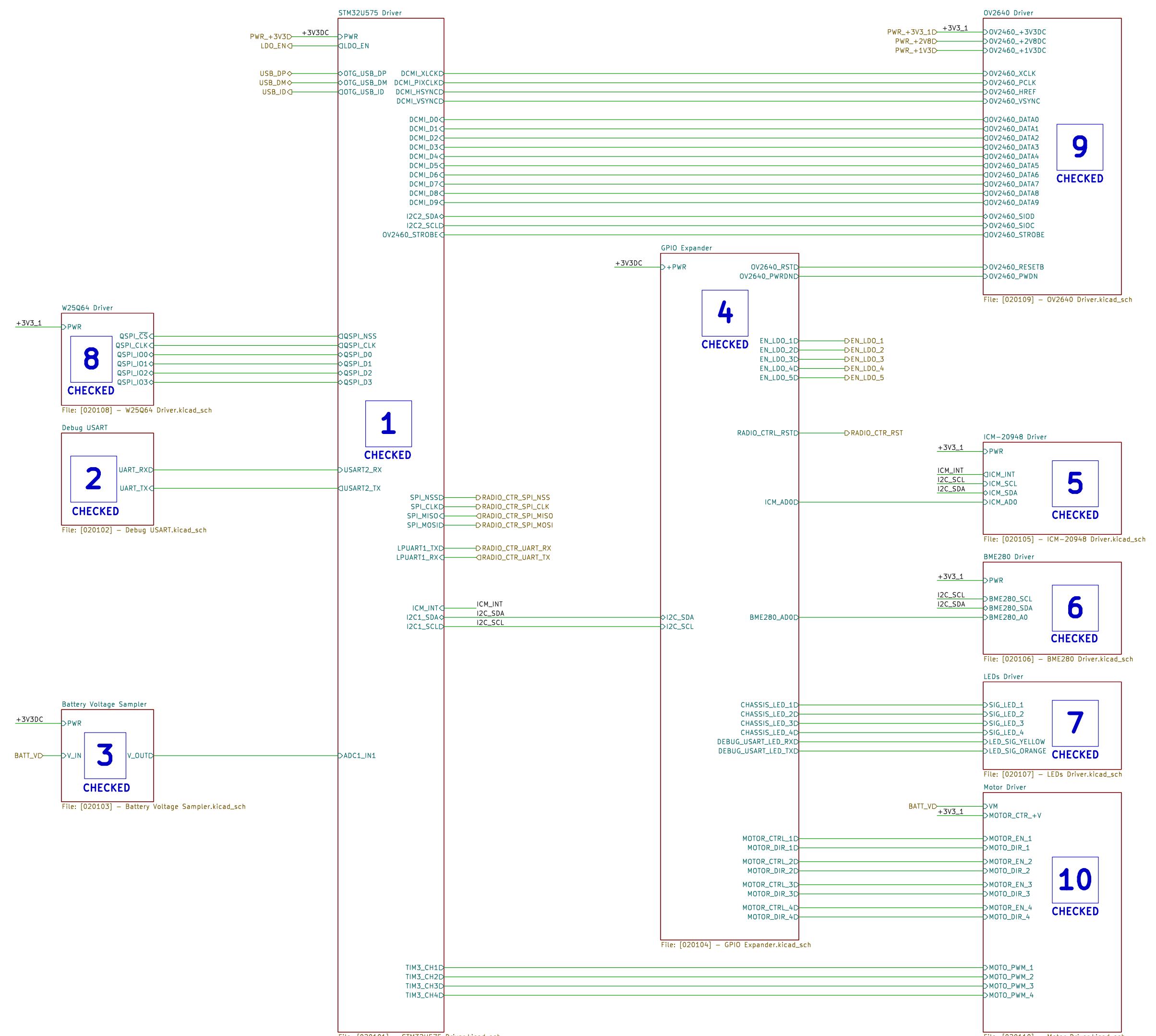
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APPROVALS		PROJECT:		
ENG: Siavash Taher Parvar	2024-03-20	Quadcopter	 <b>Mendoza</b> OPEN-SOURCE DOCUMENT	
DSN: Siavash Taher Parvar	2024-03-20			
CHK: Siavash Taher Parvar	2024-03-20	PRJ VER: 01		DOC VER: 01
REFERENCE DOCUMENTS		FILE NAME: [02] - FBD_Quadcopter.kicad_sch		DOC REV: 01
SCH Ref. DOC.: [0] - FBD_Quadcopter.kicad_sch		TITLE: <b>FBD_Quadcopter</b>		
BOM Ref. DOC.:		FILE NAME: [02] - FBD_Quadcopter.kicad_sch		
PCB Ref. DOC.:		SCALE: 1:1		
GBR Ref. DOC.:		VARIANT NAME: N/A		
ASM Ref. DOC.:		SIZE: C		
		SHEET 2 OF 40		

# FBD\_FlightController

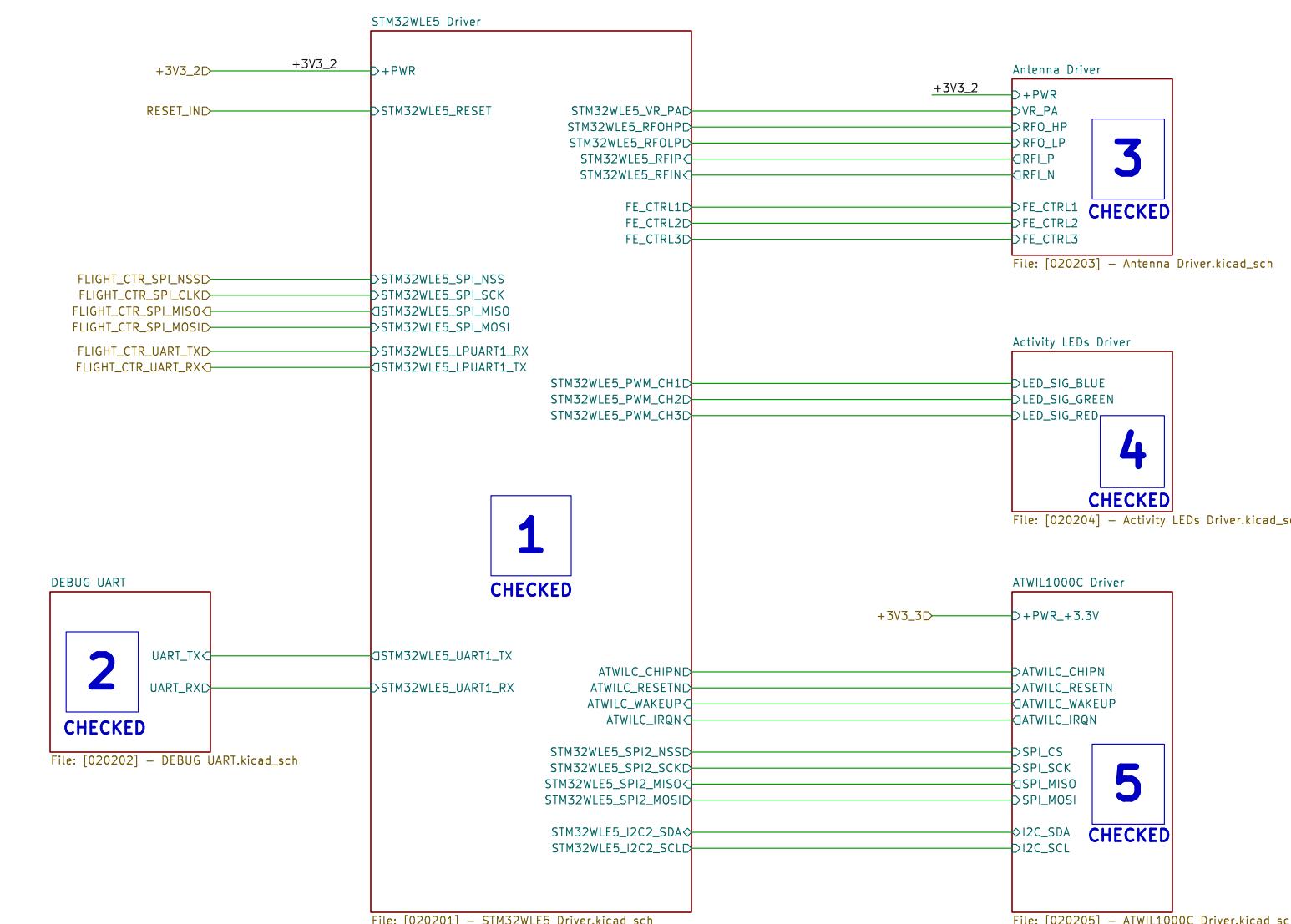
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APPROVALS		DATE	PROJECT: Quadcopter			Mendozo	
ENG:	DSN:	CHK:	PRJ VER: 01	DOC VER: 01	DOC REV: 01		
REFERENCE DOCUMENTS							
SCH Ref. DOC.: [0201] - FBD_FlightController.kicad_sch							
BOM Ref. DOC.:							
PCB Ref. DOC.:							
GBR Ref. DOC.:							
ASM Ref. DOC.:							
FILE NAME: [0201] - FBD_FlightController.kicad_sch							
SHEET 3 OF 40		SIZE: C	SCALE: 1:1	VARIANT NAME: N/A			

# FBD\_RadioController

CHECKED



APPROVALS		PROJECT:	
ENG: Sivash Taher Parvar	2024-03-20	Quadcopter	 <b>Mendozo</b> OPEN-SOURCE DOCUMENT
DSN: Sivash Taher Parvar	2024-03-20		
CHK: Sivash Taher Parvar	2024-03-20	PRJ VER: 01	
BOM Ref. DOC.: SCH Ref. DOC.: PCB Ref. DOC.: GBR Ref. DOC.: ASM Ref. DOC.:		DOC VER: 01	
REFERENCE DOCUMENTS			TITLE: <b>FBD_RadioController</b>
			FILE NAME: [0202] - FBD_RadioController.kicad_sch
			SHEET 4 OF 40 SIZE: C SCALE: 1:1 VARIANT NAME: N/A

# Power Supply

**CHECKED**

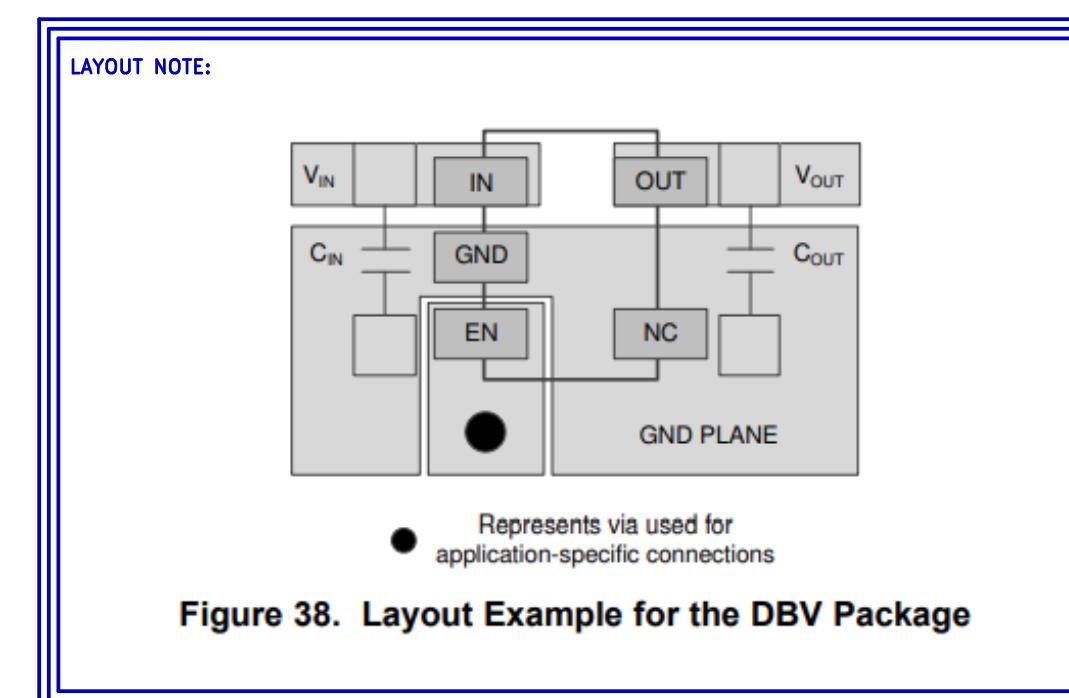
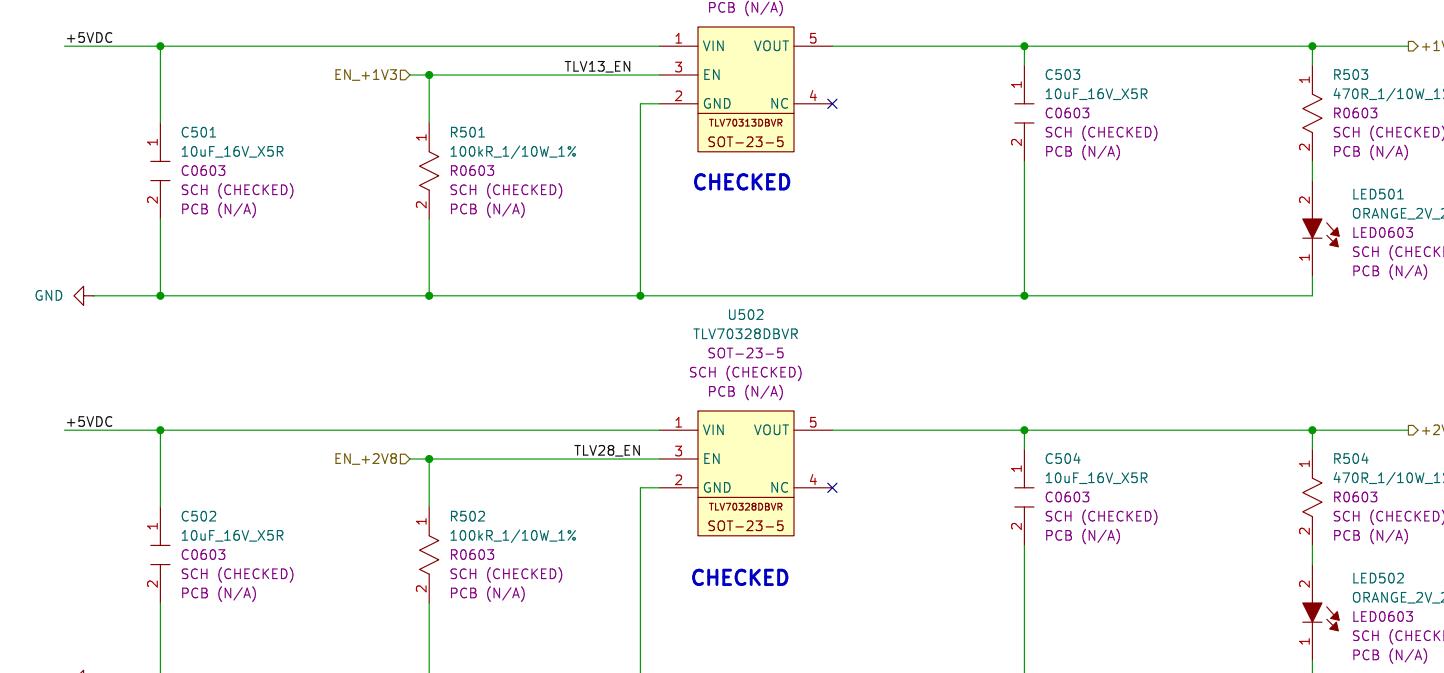
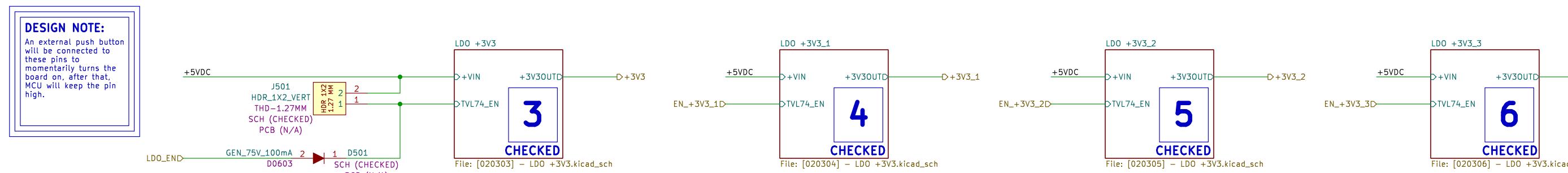
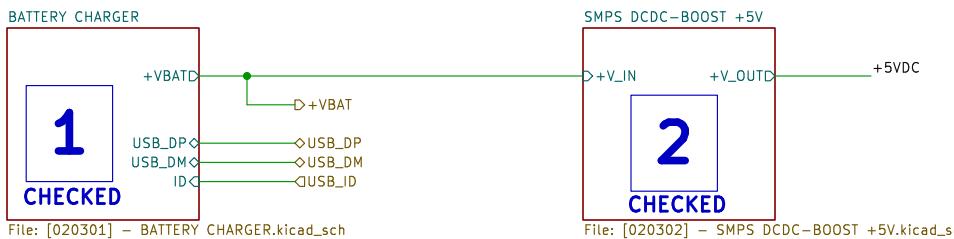
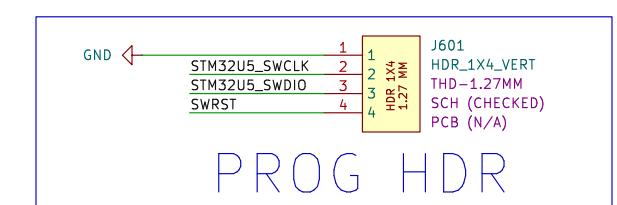
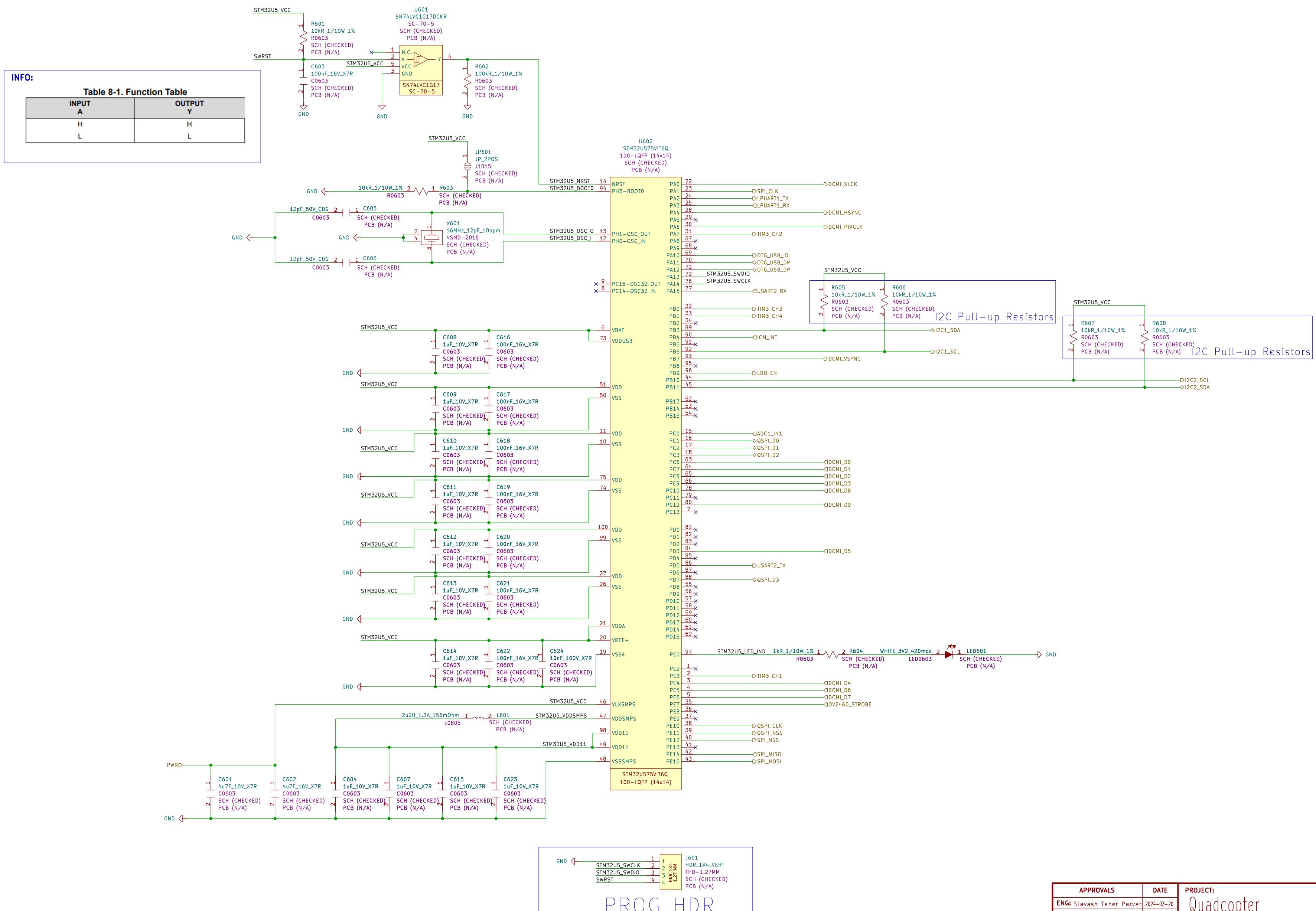


Figure 38. Layout Example for the DBV Package

APPROVALS		DATE	PROJECT:		
ENG:	Sivash Taher Parvar	2024-03-18	Quadcceptor		
DSN:	Sivash Taher Parvar	2024-03-18			
CHK:	Sivash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01
REFERENCE DOCUMENTS			TITLE:		
SCH Ref. DOC.: [0203] - Power Supply.kicad_sch			Power Supply		
BOM Ref. DOC.:			FILE NAME: [0203] - Power Supply.kicad_sch		
PCB Ref. DOC.:			SHEET 5 OF 40		
GBR Ref. DOC.:			SIZE: C		
ASM Ref. DOC.:			SCALE: 1:1		
OPEN-SOURCE DOCUMENT			VARIANT NAME: N/A		

# STM32U575 Driver

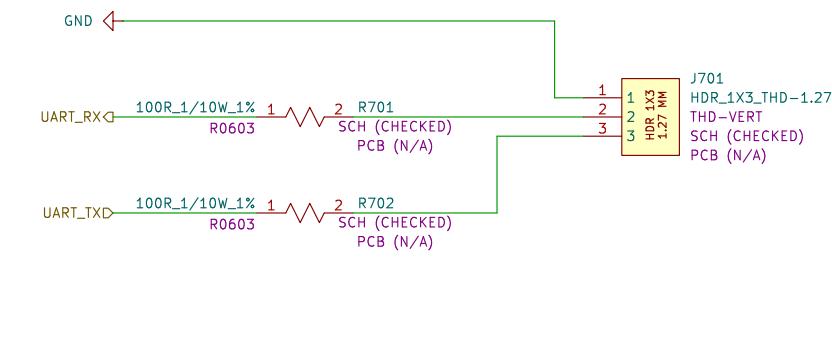
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APPROVALS		DATE	PROJECT: Quadcopter		
ENG: Sivash Taher Parvar		2024-03-20	PRJ VER: 01	DOC VER: 01	
DSN: Sivash Taher Parvar		2024-03-20	DOC REV: 01		
CHK: Sivash Taher Parvar		2024-03-20	TITLE: STM32U575 Driver		
REFERENCE DOCUMENTS			FILE NAME: [020101] - STM32U575 Driver.kicad_sch		
SCH Ref. DOC.: [020101] - STM32U575 Driver.kicad_sch					
BOM Ref. DOC.:					
PCB Ref. DOC.:					
GBR Ref. DOC.:					
ASM Ref. DOC.:					
SHEET 5 OF 40		SIZE: C	SCALE: 1:1	VARIANT: N/A	

# Debug USART

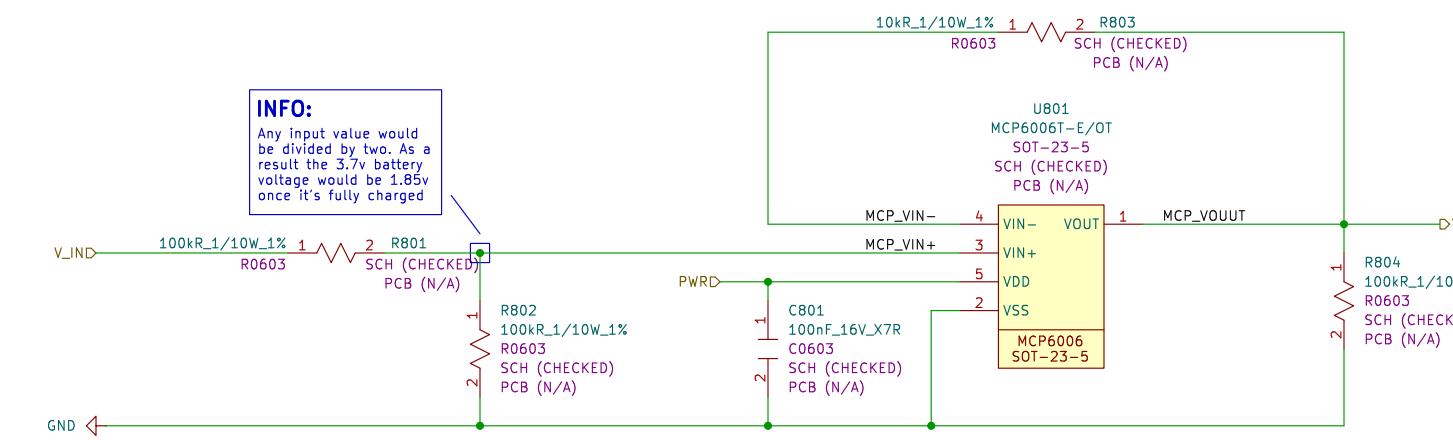
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APPROVALS		DATE	PROJECT:					
ENG:	Siavash Taher Parvar	2024-03-18	Quadcopter					
DSN:	Siavash Taher Parvar	2024-03-18						
CHK:	Siavash Taher Parvar	2024-03-18	PRJ VER:	01	DOC VER:	01	DOC REV:	01
REFERENCE DOCUMENTS		TITLE:			Mendozo			
SCH Ref. DOC.:	[02010] - Debug USART.kicad_sch	Debug USART			OPEN-SOURCE DOCUMENT			
BOM Ref. DOC.:								
PCB Ref. DOC.:								
GBR Ref. DOC.:								
ASM Ref. DOC.:								
FILE NAME: [020102] - Debug USART.kicad_sch			SHEET 6 OF 40	SIZE: C	SCALE: 1:1			
			VARIANT NAME: N/A					

# Battery Voltage Sampler

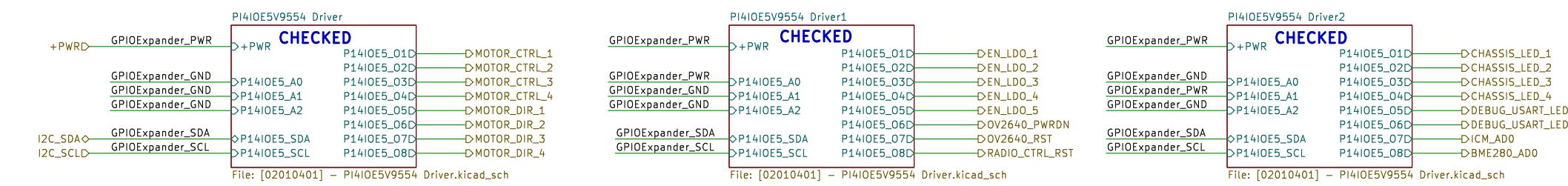
CHECKED



APPROVALS		PROJECT:		 Mendoza
ENG:	DATE	DSN:	CHK:	
Siavash Taher Parvar	2024-03-18	Siavash Taher Parvar	Siavash Taher Parvar	
REFERENCE DOCUMENTS	TITLE:		FILE NAME:	
SCH Ref. DOC.: [020103] - Battery Voltage Sampler.kicad_sch	Battery Voltage Sampler		[020103] - Battery Voltage Sampler.kicad_sch	
PCB Ref. DOC.:				
GBR Ref. DOC.:				
ASM Ref. DOC.:				
	SHEET 7 OF 40	SIZE: C	SCALE: 1:1	VARIANT NAME: N/A

# GPIO Expander

CHECKED

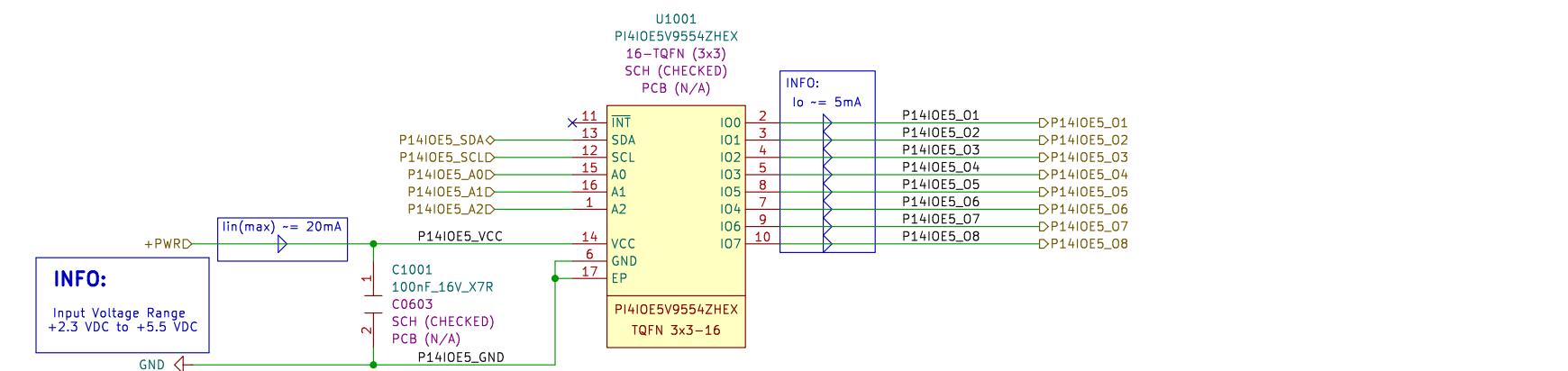


INFO:		
MOTOR CTRL 1	GROUP 1	
MOTOR CTRL 2		
MOTOR CTRL 3		
MOTOR CTRL 4		
MOTOR DIR 1	GROUP 2	
MOTOR DIR 2		
MOTOR DIR 3		
MOTOR DIR 4		
LDO1 EN	GROUP 2	
LDO2 EN		
LDO3 EN		
LDO4 EN		
LDO5 EN		
CAMERA PWRDN	GROUP 3	
CAMERA RST		
RADIO CONTROLLER RST		
CHASSIS LED 1		
CHASSIS LED 2		
CHASSIS LED 3		
CHASSIS LED 4		
DEBUG USART LED TX		
DEBUG USART LED RX		
IMU CS		
BME250 CS		

APPROVALS		DATE	PROJECT: Quadcopter					
ENG: Siavash Taher Parvar	2024-03-18	DSN: Siavash Taher Parvar	2024-03-18	CHK: Siavash Taher Parvar	2024-03-18			
PRJ VER: 01	DOC VER: 01	DOC REV: 01						
REFERENCE DOCUMENTS		TITLE: GPIO Expander	OPEN-SOURCE DOCUMENT					
SCH Ref. DOC.: [020104] - PI4IOE5V9554.kicad_sch	BOM Ref. DOC.:	PCB Ref. DOC.:	GBR Ref. DOC.:	ASM Ref. DOC.:	FILE NAME: [020104] - GPIO Expander.kicad_sch			
					SHEET 8 OF 40	SIZE: C	SCALE: 1:1	VARIANT NAME: N/A

# PI4IOE5V9554 Driver

CHECKED



INFO:								
Dynamic Characteristics								
Table 3: Dynamic Characteristics								
Symbol	Parameter	Test Conditions	Standard Mode °C	Fast Mode °C	Unit			
$f_{SCL}$	SCL Clock Frequency	—	0	100	0	400	kHz	
$t_{HF}$	Free Run Time Between a STOP and START Condition	—	4.7	—	1.3	—	μs	
$t_{HSTA}$	Hold Time (Repeated) START Condition	—	4.0	—	0.6	—	μs	
$t_{USTA}$	Setup Time for a Repeated START Condition	—	4.7	—	0.6	—	μs	
$t_{VDAck}$ <sup>[1]</sup>	Data Valid Acknowledge Time	—	—	3.45	—	0.9	μs	
$t_{DHDT}$ <sup>[2]</sup>	Data Hold Time	—	0	—	0	—	ns	
$t_{VDAT}$	Data Valid Time	—	—	3.45	—	0.9	μs	
$t_{SUDAT}$	Data Setup Time	—	250	—	100	—	ns	
$t_{LOW}$	LOW Period of the SCL Clock	—	4.7	—	1.3	—	μs	
$t_{HIGH}$	HIGH Period of the SCL Clock	—	4.0	—	0.6	—	μs	
$t_r$	Rise Time of Both SDA and SCL Signals	—	—	300	—	300	ns	
$t_{sp}$	Pulse Width of Spikes that must be Suppressed by the Input Filter	—	—	50	—	50	ns	
Port Timing								
$t_{dQ}$	Data Output Valid Time <sup>[3]</sup>	—	—	200	—	200	ns	
$t_{dIb}$	Data Input Setup Time	—	100	—	100	—	ns	
$t_{dIh}$	Data Input Hold Time	—	1	—	1	—	μs	
Interrupt Timing								
$t_{q(INT)}$	Valid Time on pin INT	—	—	4	—	4	μs	
$t_{r(INT)}$	Reset Time on pin INT	—	—	4	—	4	μs	

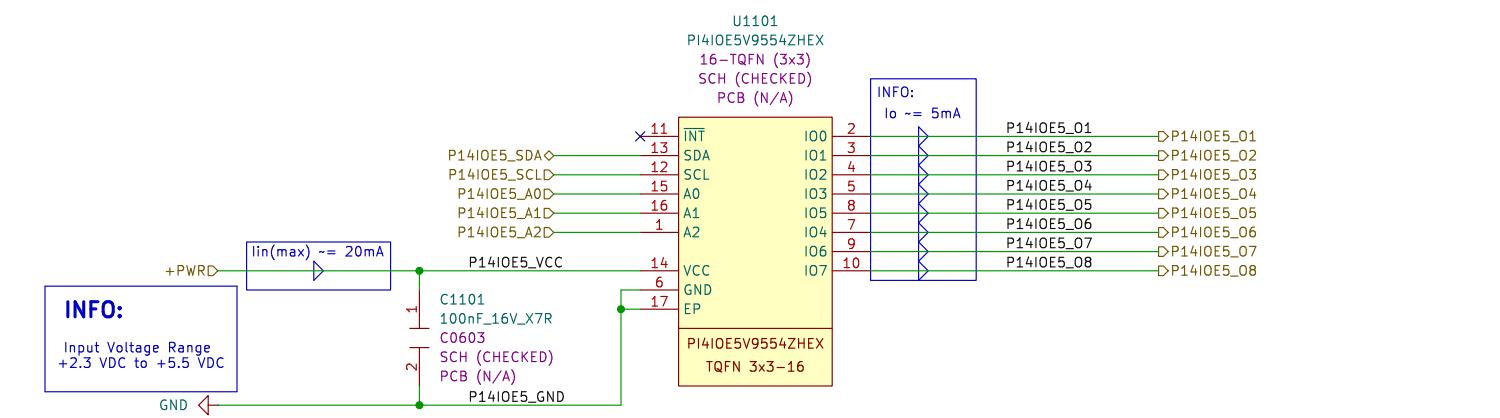
INFO:								
Table 4: Device Address Byte								
	b7(MSB)	b6	b5	b4	b3	b2	b1	b0
PI4IOE5V9554	0	1	0	0	A2	A1	A0	R/W
PI4IOE5V9554A	0	1	1	1	A2	A1	A0	R/W

Note: Read "1", Write "0"

APPROVALS		PROJECT:	
ENG: Siavash Taher Parvar	2024-03-18	Quadcopter	
DSN: Siavash Taher Parvar	2024-03-18		
CHK: Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01
REFERENCE DOCUMENTS		TITLE:	
SCH Ref. DOC.: [02010401] - PI4IOE5V9554 Driver.kicad_sch		PI4IOE5V9554 Driver	
BOM Ref. DOC.:		FILE NAME: [02010401] - PI4IOE5V9554 Driver.kicad_sch	
PCB Ref. DOC.:		SHEET 9 OF 40	
GBR Ref. DOC.:		SIZE: C	
ASM Ref. DOC.:		SCALE: 1:1	
OPEN-SOURCE DOCUMENT		VARIANT NAME: N/A	

# PI4IOE5V9554 Driver1

CHECKED



INFO:								
Dynamic Characteristics								
Table 3: Dynamic Characteristics								
Symbol	Parameter	Test Conditions	Standard Mode °C	Fast Mode °C	Unit			
$f_{SCL}$	SCL Clock Frequency	—	0	100	0	400	kHz	
$t_{HF}$	Free Run Time Between a STOP and START Condition	—	4.7	—	1.3	—	μs	
$t_{HSTA}$	Hold Time (Repeated) START Condition	—	4.0	—	0.6	—	μs	
$t_{USTA}$	Setup Time for a Repeated START Condition	—	4.7	—	0.6	—	μs	
$t_{VSAC}$ <sup>[1]</sup>	Data Valid Acknowledge Time	—	—	3.45	—	0.9	μs	
$t_{VDAT}$ <sup>[2]</sup>	Data Hold Time	—	0	—	0	—	ns	
$t_{UDAT}$	Data Valid Time	—	—	3.45	—	0.9	μs	
$t_{USAT}$	Data Setup Time	—	250	—	100	—	ns	
$t_{LOW}$	LOW Period of the SCL Clock	—	4.7	—	1.3	—	μs	
$t_{HIGH}$	HIGH Period of the SCL Clock	—	4.0	—	0.6	—	μs	
$t_r$	Rise Time of Both SDA and SCL Signals	—	—	300	—	300	ns	
$t_{sp}$	Pulse Width of Spikes that must be Suppressed by the Input Filter	—	—	50	—	50	ns	
Port Timing								
$t_{dQ}$	Data Output Valid Time <sup>[3]</sup>	—	—	200	—	200	ns	
$t_{dIb}$	Data Input Setup Time	—	100	—	100	—	ns	
$t_{dIh}$	Data Input Hold Time	—	1	—	1	—	μs	
Interrupt Timing								
$t_{q(INT)}$	Valid Time on pin INT	—	—	4	—	4	μs	
$t_{rc(INT)}$	Reset Time on pin INT	—	—	4	—	4	μs	

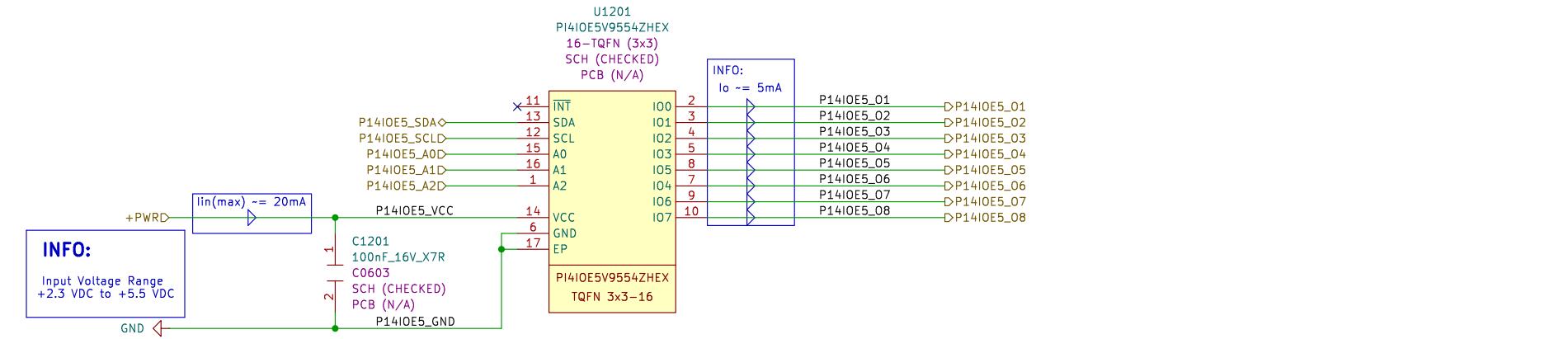
INFO:								
Table 4: Device Address Byte								
	b7(MSB)	b6	b5	b4	b3	b2	b1	b0
PI4IOE5V9554	0	1	0	0	A2	A1	A0	R/W
PI4IOE5V9554A	0	1	1	1	A2	A1	A0	R/W

Note: Read "1", Write "0"

APPROVALS		DATE	PROJECT: Quadcopter			Mendozo
ENG: Siavash Taher Parvar	2024-03-18	DSN: Siavash Taher Parvar	2024-03-18	CHK: Siavash Taher Parvar	2024-03-18	
PRJ VER: 01	DOC VER: 01	DOC REV: 01				
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BOOM Ref. DOC.:						
PCB Ref. DOC.:						
GBR Ref. DOC.:						
ASW Ref. DOC.:						
SHEET 10 OF 40	SIZE: C	SCALE: 1:1	VARIANT NAME: N/A			

# PI410E5V9554 Driver2

# CHECKED



Dynamic Characteristics								
Symbol	Parameter	Test Conditions	Standard Mode I <sup>C</sup>		Fast Mode I <sup>C</sup>		Unit	
			Min	Max	Min	Max		
t <sub>SCL</sub>	SCL Clock Frequency	—	0	100	0	400	kHz	
t <sub>BUF</sub>	Bus Free Time Between a STOP and START Condition	—	4.7	—	1.3	—	μs	
t <sub>HD STA</sub>	Hold Time (Repeated) START Condition	—	4.0	—	0.6	—	μs	
t <sub>SU STA</sub>	Setup Time for a Repeated START Condition	—	4.7	—	0.6	—	μs	
t <sub>SU STOP</sub>	Setup Time for STOP Condition	—	4.0	—	0.6	—	μs	
t <sub>VD ACK</sub> <sup>[1]</sup>	Data Valid Acknowledge Time	—	—	3.45	—	0.9	μs	
t <sub>HD DAT</sub> <sup>[2]</sup>	Data Hold Time	—	0	—	0	—	ns	
t <sub>VD DAT</sub>	Data Valid Time	—	—	3.45	—	0.9	μs	
t <sub>SU DAT</sub>	Data Setup Time	—	250	—	100	—	ns	
t <sub>LOW</sub>	LOW Period of the SCL Clock	—	4.7	—	1.3	—	μs	
t <sub>HIGH</sub>	HIGH Period of the SCL Clock	—	4.0	—	0.6	—	μs	
t <sub>f</sub>	Fall Time of Both SDA and SCL Signals	—	—	300	—	300	ns	
t <sub>r</sub>	Rise Time of Both SDA and SCL Signals	—	—	1000	—	300	ns	
t <sub>SP</sub>	Pulse Width of Spikes that must be Suppressed by the Input Filter	—	—	50	—	50	ns	
Port Timing								
t <sub>VQ</sub>	Data Output Valid Time <sup>[3]</sup>	—	—	200	—	200	ns	
t <sub>SI(D)</sub>	Data Input Setup Time	—	100	—	100	—	ns	
t <sub>HI(D)</sub>	Data Input Hold Time	—	1	—	1	—	μs	
Interrupt Timing								
t <sub>V(INT)</sub>	Valid Time on pin INT	—	—	4	—	4	μs	
t <sub>REC(INT)</sub>	Reset Time on pin INT	—	—	4	—	4	μs	

## INFO:

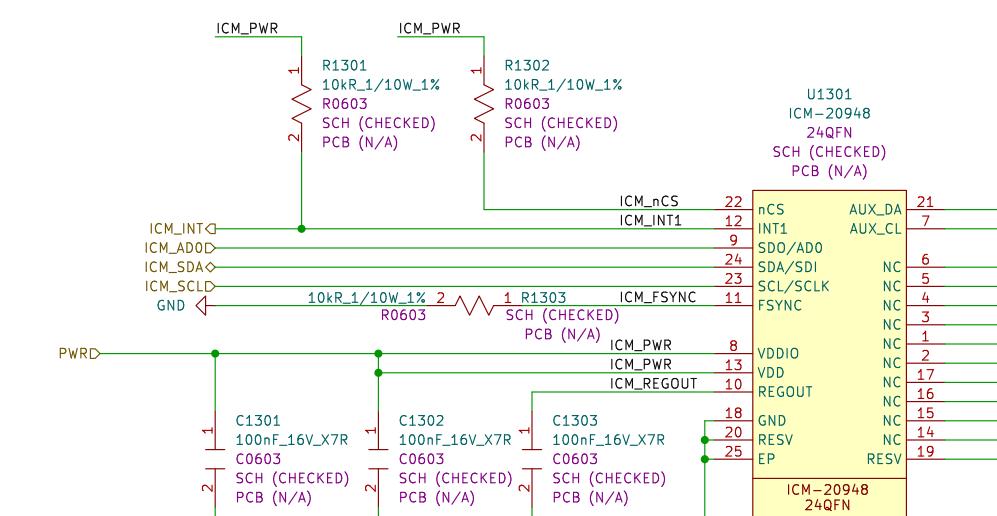
Table 4: Device Address Byte								
	b7(MSB)	b6	b5	b4	b3	b2	b1	b0
PI4IOE5V9554	0	1	0	0	A2	A1	A0	R/W
PI4IOE5V9554A	0	1	1	1	A2	A1	A0	R/W

Note: Read “1”, Write “0”

APPROVALS	DATE	PROJECT: Quadcopter			 <b>Mend0zo</b>
ENG: Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01	
DSN: Siavash Taher Parvar	2024-03-18				
CHK: Siavash Taher Parvar	2024-03-18				
<b>REFERENCE DOCUMENTS</b>		TITLE: PI410E5V9554 Driver2			<b>OPEN-SOURCE DOCUMENT</b>
SCH Ref. DOC.: [02010401] - PI410E5V9554.Driver.kicad_sch					
BOM Ref. DOC.:					
PCB Ref. DOC.:		FILE NAME: [02010401] - PI410E5V9554.Driver.kicad_sch			
GBR Ref. DOC.:					
ASM Ref. DOC.:		SHEET 11 OF 40	SIZE: C	SCALE: 1:1	VARIANT NAME: N/A

# ICM-20948 Driver

CHECKED



**CAUTIONARY:**  
Power up with SDA/SCLK and nCS pins held high to a supported user logic level. In case this power up approach is used, software reset is required using the PWR\_MGMT\_1 register, prior to initialization.

**INFO:**

The slave address of the ICM-20948 is b110100X which is 7 bits long. The LSB bit of the 7-bit address is determined by the logic level on pin ADO. This allows two ICM-20948 devices to be connected to the same I2C bus. When used in this configuration, the address of the one of the devices should be b1101000 (pin ADO is logic low) and the address of the other should be b1101001 (pin ADO is logic high).

**INFO:**

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
ACCELEROMETER SENSITIVITY						
Full-Scale Range	ACCEL_FS=0	±2	G	1		
	ACCEL_FS=1	±4	G	1		
	ACCEL_FS=2	±8	G	1		
	ACCEL_FS=3	±16	G	1		
ADC Word Length	Output in two's complement format	16	Bits	1		
ZERO-G OUTPUT						
Initial Tolerance	Component-level	±0.5	%	2		
Sensitivity Change vs. Temperature	-40°C to +85°C ACCEL_FS=0	±0.026	%/°C	2		
Nonlinearity	Best Fit Straight Line	±0.5	%	2, 3		
Cross-Axis Sensitivity		±2	%	2, 3		
ACCELEROMETER NOISE PERFORMANCE						
Noise Spectral Density	Based on Noise Bandwidth = 10 Hz	230			µg/√Hz	2
LOW PASS FILTER RESPONSE	Programmable Range	5.7	246	Hz	1, 3	
ACCELEROMETER STARTUP TIME						
From Sleep mode	20	ms	2, 3			
From Cold Start, 1 ms V <sub>DD</sub> ramp	30	ms	2, 3			
OUTPUT DATA RATE						
Low-Power Mode	0.27	562.5	Hz			
Low-Noise Mode	ACCEL_FCHOICE=1; ACCEL_DLPCFG=x	4.5	1.125k	Hz		1
Low-Noise Mode	ACCEL_FCHOICE=0; ACCEL_DLPCFG=x			4.5k	Hz	

Table 2. Accelerometer Specifications

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
GYROSCOPE SENSITIVITY						
Full-Scale Range	GYRO_FS_SEL=0	±250			dps	1
	GYRO_FS_SEL=1	±500			dps	1
	GYRO_FS_SEL=2	±1000			dps	1
	GYRO_FS_SEL=3	±2000			dps	1
GYROSCOPE ADC WORD LENGTH						
Sensitivity Scale Factor		16	bits	1		
GYROSCOPE ZERORATE OUTPUT (GYRO_FS_SEL=0)						
Initial ZRO Tolerance	25°C (Component-level)	±5	dps	2		
ZRO Variation Over Temperature	-40°C to +85°C	±0.05	dps/°C	2		
GYROSCOPE NOISE PERFORMANCE (GYRO_FS_SEL=0)						
Noise Spectral Density	Based on Noise Bandwidth = 10 Hz	0.015			dps/√Hz	2
GYROSCOPE MECHANICAL FREQUENCIES		25	27	29	kHz	2
LOW PASS FILTER RESPONSE	Programmable Range	5.7	197	Hz	1, 3	
GYROSCOPE START-UP TIME						
From Full-Chip Sleep mode	35	ms	2, 3			
OUTPUT DATA RATE						
Low-Power Mode	4.4	562.5	Hz			
Low-Noise Mode	GYRO_FCHOICE=1; GYRO_DLPCFG=x	4.4	1.125k	Hz		1
Low-Noise Mode	GYRO_FCHOICE=0; GYRO_DLPCFG=x			9k	Hz	

Table 1. Gyroscope Specifications

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
MAGNETOMETER SENSITIVITY						
Full-Scale Range		±4900			µT	1
Output Resolution		16	bits	1		
Sensitivity Scale Factor		0.15			µT / LSB	1
ZERO-FIELD OUTPUT						
Initial Calibration Tolerance		-2000		+2000	LSB	2
OTHER						
Output Data Rate				100	Hz	1

Table 3. Magnetometer Specifications

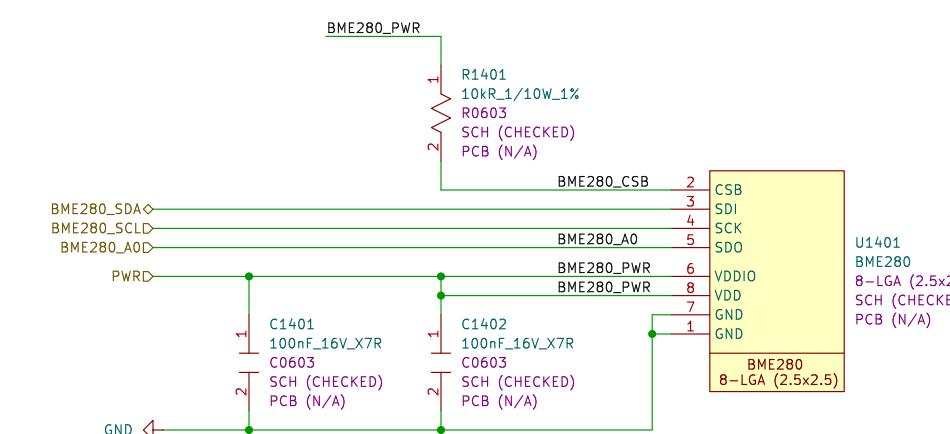
PARAMETERS	CONDITIONS	MIN	TYPICAL	MAX	UNITS	NOTES
I²C TIMING						
<i>f<sub>SCL</sub></i> , SCL Clock Frequency				400	kHz	1, 2
<i>t<sub>H0 STA</sub></i> , (Repeated) START Condition Hold Time		0.6			µs	1, 2
<i>t<sub>L01</sub></i> , SCL Low Period		1.3			µs	1, 2
<i>t<sub>H01</sub></i> , SCL High Period		0.6			µs	1, 2
<i>t<sub>SU STA</sub></i> , Repeated START Condition Setup Time		0.6			µs	1, 2
<i>t<sub>H0 DAT</sub></i> , SDA Data Hold Time		0			µs	1, 2
<i>t<sub>SU DAT</sub></i> , SDA Data Setup Time		100			ns	1, 2
<i>t<sub>r</sub></i> , SDA and SCL Rise Time	C <sub>b</sub> bus cap. from 10 to 400 pF	20+0.1C <sub>b</sub>		300	ns	1, 2
<i>t<sub>f</sub></i> , SDA and SCL Fall Time	C <sub>b</sub> bus cap. from 10 to 400 pF	20+0.1C <sub>b</sub>		300	ns	1, 2
<i>t<sub>SU STA</sub></i> , STOP Condition Setup Time		0.6			µs	1, 2
<i>t<sub>B0</sub></i> , Bus Free Time Between STOP and START Condition		1.3			µs	1, 2
C <sub>b</sub> , Capacitive Load for each Bus Line			< 400		pF	1, 2
<i>t<sub>D0 DAT</sub></i> , Data Valid Data Time				0.9	µs	1, 2
<i>t<sub>D0 ACK</sub></i> , Data Valid Acknowledge Time				0.9	µs	1, 2

Table 7. I²C Timing Characteristics

APPROVALS	DATE	PROJECT: Quadcopter		Mendozo OPEN-SOURCE DOCUMENT	
ENG: Sivash Taher Parvar	2024-03-18				
DSN: Sivash Taher Parvar	2024-03-18				
CHK: Sivash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01		
REFERENCE DOCUMENTS		TITLE: ICM-20948 Driver			
SCH Ref. DOC.: [020105] - ICM-20948 Driver.kicad_sch		FILE NAME: [020105] - ICM-20948 Driver.kicad_sch			
BOM Ref. DOC.:		SHEET 12 OF 40			
PCB Ref. DOC.:		SIZE: C			
GBR Ref. DOC.:		SCALE: 1:1			
ASM Ref. DOC.:		VARIANT:N/A			

# BME280 Driver

CHECKED



**INFO:**

The 7-bit address is 111011x. The 6 MSB bits are fixed. The last bit is changeable by SDO value and can be changed during operation. Connecting SDO to ground results in slave address 1110110 (0x76); connecting it to VDDIO results in slave address 1110111 (0x77), which is the same as BMP280's I<sup>2</sup>C address.

**CAUTIONARY:**

The SDO pin cannot be left floating; if left floating, the I<sup>2</sup>C address will be undefined.

**INFO:**

Table 35: Pin description

Pin	Name	I/O Type	Description	Connect to		
				SPI 4W	SPI 3W	I <sup>2</sup> C
1	GND	Supply	Ground			GND
2	CSB	In	Chip select	CSB	CSB	V <sub>DDIO</sub>
3	SDI	In/Out	Serial data input	SDI	SDI/SDO	SDA
4	SCK	In	Serial clock input	SCK	SCK	SCL
5	SDO	In/Out	Serial data output	SDO	DNC	GND for default address
6	V <sub>DDIO</sub>	Supply	Digital / Interface supply			V <sub>DDIO</sub>
7	GND	Supply	Ground			GND
8	V <sub>DD</sub>	Supply	Analog supply			V <sub>DD</sub>

Table 33: I<sup>2</sup>C timings

Parameter	Symbol	Condition	Min	Typ	Max	Unit
SDI setup time	t <sub>SDI;DAT</sub>	S&F Mode HS mode	160			ns
			30			ns
SDI hold time	t <sub>HD;DAT</sub>	S&F Mode, C <sub>b</sub> ≤100 pF S&F Mode, C <sub>b</sub> ≤400 pF HS mode, C <sub>b</sub> ≤100 pF HS mode, C <sub>b</sub> ≤400 pF	80			ns
			90			ns
			18		115	ns
			24		150	ns
SCK low pulse	t <sub>LOW</sub>	HS mode, C <sub>b</sub> ≤100 pF V <sub>DDIO</sub> = 1.62 V	160			ns
SCK low pulse	t <sub>LOW</sub>	HS mode, C <sub>b</sub> ≤100 pF V <sub>DDIO</sub> = 1.2 V	210			ns

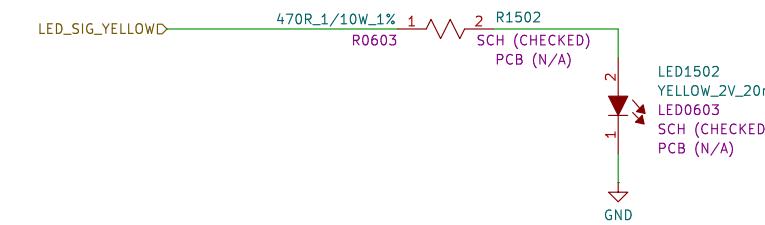
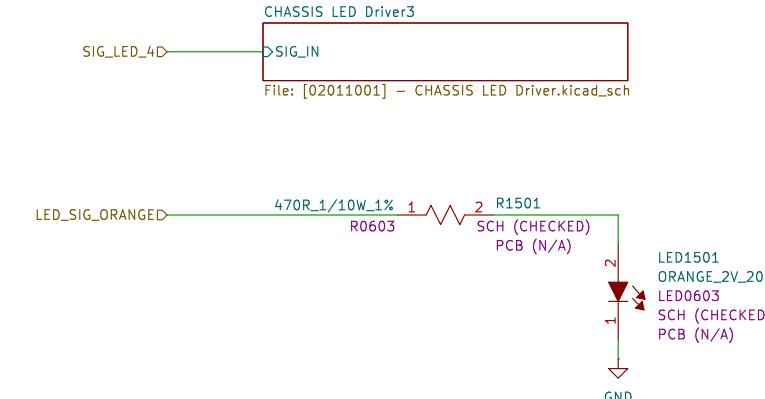
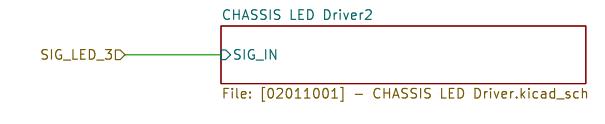
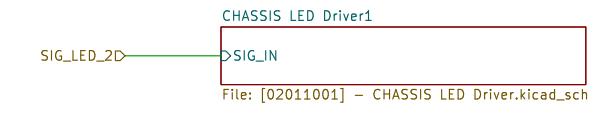
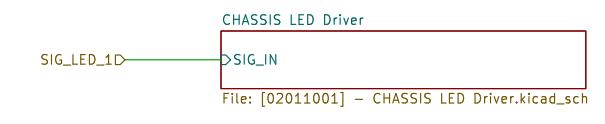
The above-mentioned I<sup>2</sup>C specific timings correspond to the following internal added delays:

- Input delay between SDI and SCK inputs: SDI is more delayed than SCK by typically 100 ns in Standard and Fast Modes and by typically 20 ns in High Speed Mode.
- Output delay from SCK falling edge to SDI output propagation is typically 140 ns in Standard and Fast Modes and typically 70 ns in High Speed Mode.

APPROVALS	DATE	PROJECT: Quadcopter			Mendozo
ENG: Sivash Taher Parvar	2024-03-18	DSN: Sivash Taher Parvar	2024-03-18	CHK: Sivash Taher Parvar	
PRJ VER: 01			DOC VER: 01	DOC REV: 01	
REFERENCE DOCUMENTS			TITLE: BME280 Driver		
SCH Ref. DOC.: [020106] - BME280 Driver.kicad_sch			FILE NAME: [020106] - BME280 Driver.kicad_sch		
PCB Ref. DOC.: [020106] - BME280 Driver.kicad_pcb			SCALE: 1:1		
GBR Ref. DOC.: [020106] - BME280 Driver.kicad_gbr			VARIANT NAME: N/A		
ASM Ref. DOC.: [020106] - BME280 Driver.kicad_asm			SHEET: 13 OF 40	SIZE: C	SCALE: 1:1

# LEDs Driver

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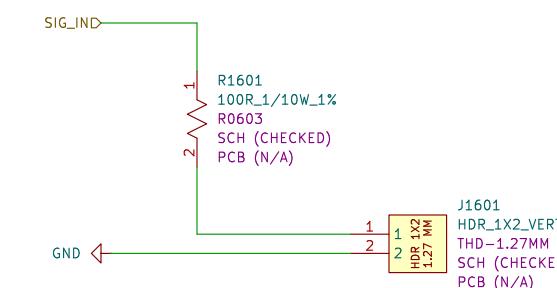
APPROVALS		PROJECT:	
ENG:	DATE	Quadcopter	
Siavash Taher Parvar	2024-03-18	DSN: Siavash Taher Parvar 2024-03-18	
Siavash Taher Parvar	2024-03-18	CHK: Siavash Taher Parvar 2024-03-18	
PRJ VER: 01		DOC VER: 01	
REFERENCE DOCUMENTS			TITLE: LEDs Driver
SCH Ref. DOC.: [020107] - LEDs Driver.kicad_sch			FILE NAME: [020107] - LEDs Driver.kicad_sch
BOM Ref. DOC.:			SIZE: C
PCB Ref. DOC.:			SCALE: 1:1
GBR Ref. DOC.:			VARIANT NAME: N/A
ASM Ref. DOC.:			
SHEET 14 OF 40			
Mendoza			
OPEN-SOURCE DOCUMENT			

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REVISION	DESCRIPTION	DATE	APPROVED
01	First Version	2024-03-18	Siavash Taher Parvar

# CHASSIS LED Driver

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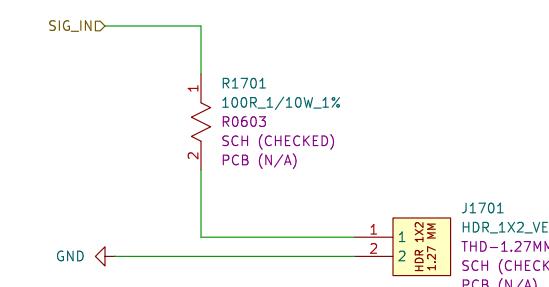
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ENG:	Siavash Taher Parvar	2024-03-18							
DSN:	Siavash Taher Parvar	2024-03-18	PRJ VER: 01    DOC VER: 01    DOC REV: 01						
CHK:	Siavash Taher Parvar	2024-03-18	TITLE: CHASSIS LED Driver						
FILE NAME: [02011001] - CHASSIS LED Driver.kicad_sch						OPEN-SOURCE DOCUMENT			
REFERENCE DOCUMENTS							Variant Name: N/A		
SCH Ref. DOC.: [02011001] - CHASSIS LED Driver.kicad_sch									
BOM Ref. DOC.:									
PCB Ref. DOC.:									
GBR Ref. DOC.:									
ASM Ref. DOC.:									
SHEET 15 OF 40	SIZE: C	SCALE: 1:1							

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REVISION	DESCRIPTION	DATE	APPROVED
01	First Version	2024-03-18	Siavash Taher Parvar

# CHASSIS LED Driver1

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APPROVALS		DATE	PROJECT:					
ENG:	Siavash Taher Parvar	2024-03-18	Quadcopter					
DSN:	Siavash Taher Parvar	2024-03-18	PRJ VER:	01	DOC VER: 01			
CHK:	Siavash Taher Parvar	2024-03-18	DOC REV: 01					
REFERENCE DOCUMENTS		TITLE:						
SCH Ref. DOC.:	[02011001] - CHASSIS LED Driver.kicad_sch	CHASSIS LED Driver1						
BOM Ref. DOC.:								
PCB Ref. DOC.:								
GBR Ref. DOC.:								
ASM Ref. DOC.:								
FILE NAME: [02011001] - CHASSIS LED Driver.kicad_sch			SHEET: 16	OF: 40	SIZE: C			
			SCALE: 1:1		VARIANT NAME: N/A			



Mendoza

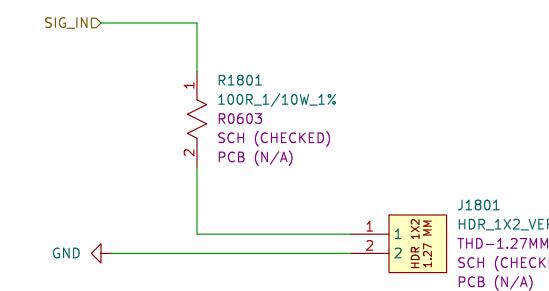
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REVISION	DESCRIPTION	DATE	APPROVED
01	First Version	2024-03-18	Siavash Taher Parvar

# CHASSIS LED Driver2

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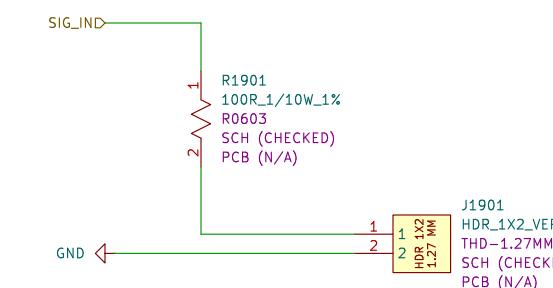
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ENG:	Siavash Taher Parvar	2024-03-18	Quadcopter						
DSN:	Siavash Taher Parvar	2024-03-18							
CHK:	Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01				
REFERENCE DOCUMENTS		TITLE:							
SCH Ref. DOC.:	[02011001] - CHASSIS LED Driver.kicad_sch	CHASSIS LED Driver2							
BOM Ref. DOC.:		FILE NAME: [02011001] - CHASSIS LED Driver.kicad_sch							
PCB Ref. DOC.:		SHEET 17 OF 40   SIZE: C   SCALE: 1:1   VARIANT NAME: N/A							
GBR Ref. DOC.:									
ASM Ref. DOC.:									
Mendoza									
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REVISION	DESCRIPTION	DATE	APPROVED
01	First Version	2024-03-18	Siavash Taher Parvar

# CHASSIS LED Driver3

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APPROVALS		DATE	PROJECT:					
ENG:	Siavash Taher Parvar	2024-03-18	Quadcopter					
DSN:	Siavash Taher Parvar	2024-03-18	PRJ VER:	01	DOC VER: 01			
CHK:	Siavash Taher Parvar	2024-03-18	DOC REV: 01					
REFERENCE DOCUMENTS		TITLE:						
SCH Ref. DOC.:	[02011001] - CHASSIS LED Driver.kicad_sch	CHASSIS LED Driver3						
BOM Ref. DOC.:								
PCB Ref. DOC.:								
GBR Ref. DOC.:								
ASM Ref. DOC.:								
FILE NAME: [02011001] - CHASSIS LED Driver.kicad_sch			SHEET: 18	OF: 40	SIZE: C			
			SCALE: 1:1		VARIANT NAME: N/A			

# W25Q64 Driver

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## INFO:

### 9.6 AC Electrical Characteristics<sup>(6)</sup>

DESCRIPTION	SYMBOL	ALT	SPEC			UNIT
			MIN	TYP	MAX	
Clock frequency except for Read Data (03h) instructions (3.0V-3.6V)	$f_R$	$f_{C1}$	D.C.		133	MHz
Clock frequency except for Read Data (03h) instructions( 2.7V-3.0V)	$f_R$	$f_{C2}$	D.C.		104	MHz
Clock frequency for Read Data instruction (03h)	$f_R$		D.C.		50	MHz
Clock High, Low Time for all instructions except for Read Data (03h)	$t_{CLH}, t_{CLL}^{(1)}$		45% PC			ns
Clock High, Low Time for Read Data (03h) instruction	$t_{CRLH}, t_{CRLL}^{(1)}$		45% PC			ns
Clock Rise Time peak to peak	$t_{CLCH}^{(2)}$		0.1			V/ns
Clock Fall Time peak to peak	$t_{CHCL}^{(2)}$		0.1			V/ns
/CS Active Setup Time relative to CLK	$t_{SLCH}$	$t_{CSS}$	3			ns
/CS Not Active Hold Time relative to CLK	$t_{CHSL}$		3			ns
Data In Setup Time	$t_{DVCH}$	$t_{DSU}$	1			ns
Data In Hold Time	$t_{CHDX}$	$t_{DH}$	2			ns
/CS Active Hold Time relative to CLK	$t_{CHSH}$		3			ns
/CS Not Active Setup Time relative to CLK	$t_{SHCH}$		3			ns
/CS Deselect Time (for Read)	$t_{SHSL1}$	$t_{CSH}$	10			ns
/CS Deselect Time (for Erase or Program or Write)	$t_{SHSL2}$	$t_{CSH}$	50			ns
Output Disable Time	$t_{HQZ}^{(2)}$	$t_{DIS}$		7		ns
Clock Low to Output Valid 2.7V-3.6V	$t_{CLOV}$	$t_{V}$		6		ns
Output Hold Time	$t_{CLOX}$	$t_{HO}$	1.5			ns

APPROVALS		DATE	PROJECT: Quadcopter			Mendozo
ENG: Siavash Taher Parvar		2024-03-18				
DSN: Siavash Taher Parvar		2024-03-18				
CHK: Siavash Taher Parvar		2024-03-18	PRJ VER: 01    DOC VER: 01    DOC REV: 01			
REFERENCE DOCUMENTS			TITLE: W25Q64 Driver			
SCH Ref. DOC.: [020108] - W25Q64_Universal.sch						
BOM Ref. DOC.:						
PCB Ref. DOC.:						
GBR Ref. DOC.:						
ASM Ref. DOC.:			FILE NAME: [020108] - W25Q64_Driver.kicad_sch			
			SHEET 19	OF 40	SIZE: C	SCALE: 1:1
					VARIANT NAME: N/A	

# OV2640 Driver

# CHECKED

INFO:

**Table 9 Pixel Timing Specifications**

Symbol	Parameter	Min	Typ	Max	Unit
$t_p$	PCLK period		27.78		ns
$t_{pr}$	PCLK rising time		3.5		ns
$t_{pf}$	PCLK falling time		2.2		ns
$t_{dphr}$	PCLK negative edge to HREF rising edge	0		5	ns
$t_{dphf}$	PCLK negative edge to HREF negative edge	0		5	ns
$t_{dpd}$	PCLK negative edge to data output delay	0		5	ns
$t_{su}$	Data bus setup time	15			ns
$t_{hd}$	Data bus hold time	8			ns

**NOTE:**  
Connector PWDN should be connected to ground if unused.  
Sensor reset pin RESETB is active low.  
AVDD is 2.8V sensor analog power.  
DVDD is 1.3V sensor digital power.  
DOVDD is 1.8V to 3.0V sensor digital IO power.  
Sensor AGND and DGND should be separated and connected to a single point outside PCB (DO NOT connect inside module).  
C1, C2 should be close to sensor DVDD and DGND.  
C3 should be close to sensor SVDD, AVDD and AGND.  
C4 should be close to sensor VREFH and AGND.  
C5 should be close to sensor VREFN and AGND.  
C6 should close to sensor DOVDD and DGND.  
C7 should close to sensor EVDD and DGND.  
D[9:2] is module YUV and RGB 8-bit output (D9: MSB, D2: LSB).  
D[9:0] is module raw RGB 10-bit output (D9: MSB, D0: LSB).

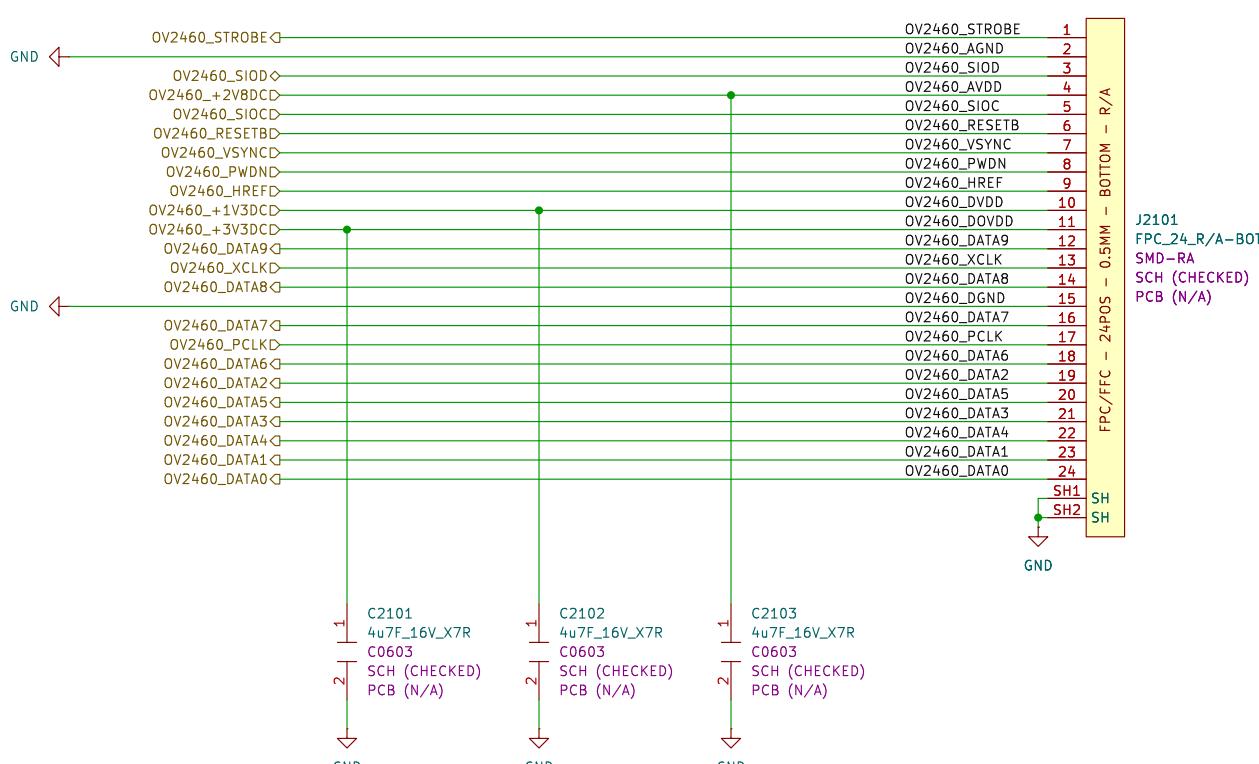
2640ESI\_FDS\_003

**Table 8 SCCB Interface Timing Specifications**

Symbol	Parameter	Min	Typ	Max	Unit
$f_{SIO\_C}$	Clock Frequency			400	KHz
$t_{LOW}$	Clock Low Period	1.3			μs
$t_{HIGH}$	Clock High Period	600			ns
$t_{AA}$	SIOC low to Data Out valid	100		900	ns
$t_{BUF}$	Bus free time before new START	1.3			μs
$t_{HD:STA}$	START condition Hold time	600			ns
$t_{SU:STA}$	START condition Setup time	600			ns
$t_{HD:DAT}$	Data-in Hold time	0			μs
$t_{SU:DAT}$	Data-in Setup time	100			ns
$t_{SU:STO}$	STOP condition Setup time	600			ns
$t_R, t_F$	SCCB Rise/Fall times			300	ns
$t_{DH}$	Data-out Hold time	50			ns

**Table 7 Timing Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit
<b>Oscillator and Clock Input</b>					
fosc	Frequency (XCLK)	6	24		MHz
t <sub>r</sub> , t <sub>f</sub>	Clock input rise/fall time			5	ns
	Clock input duty cycle	45	50	55	%



DESIGN NOTE

OV2640 has 10-bit video port, D[9:0]. For 10-bit RGB raw output, D[9:0] are used. For 8-bit YCbCr, 8-bit RGB raw or 8-bit RGB 565 output, only D[9:2] are used.

DESIGN NOTE

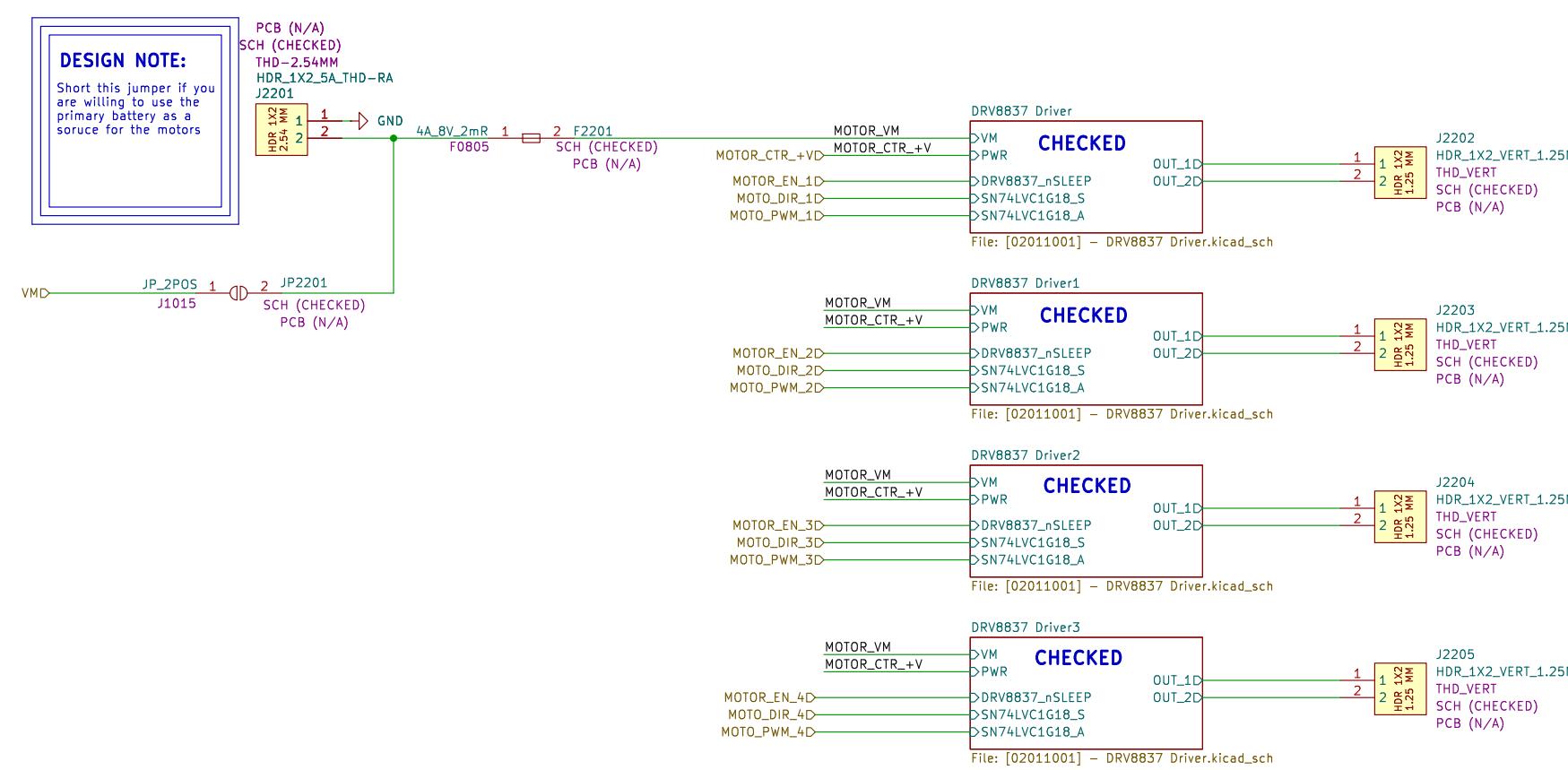
**PWDN** is active high. There is no internal pull-down/pull-up resistor. It can be controlled by a GPIO, or connected to DGND using an external pull-down resistor if not used.

DESIGN NOTE

**DESIGN NOTE:**  
Resetb is active low. There is no internal pull-down/pull-up resistor. It can be controlled by a GPIO, or connected to DVDD0 using an external pull-up resistor if not used. If Resetb is connected to DVDD0, the OV2640 camera module could be reset by SCCR setting.

# Motor Driver

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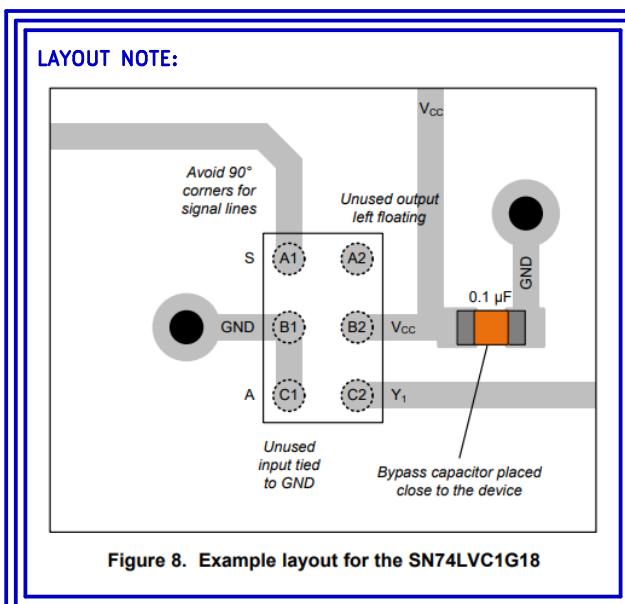
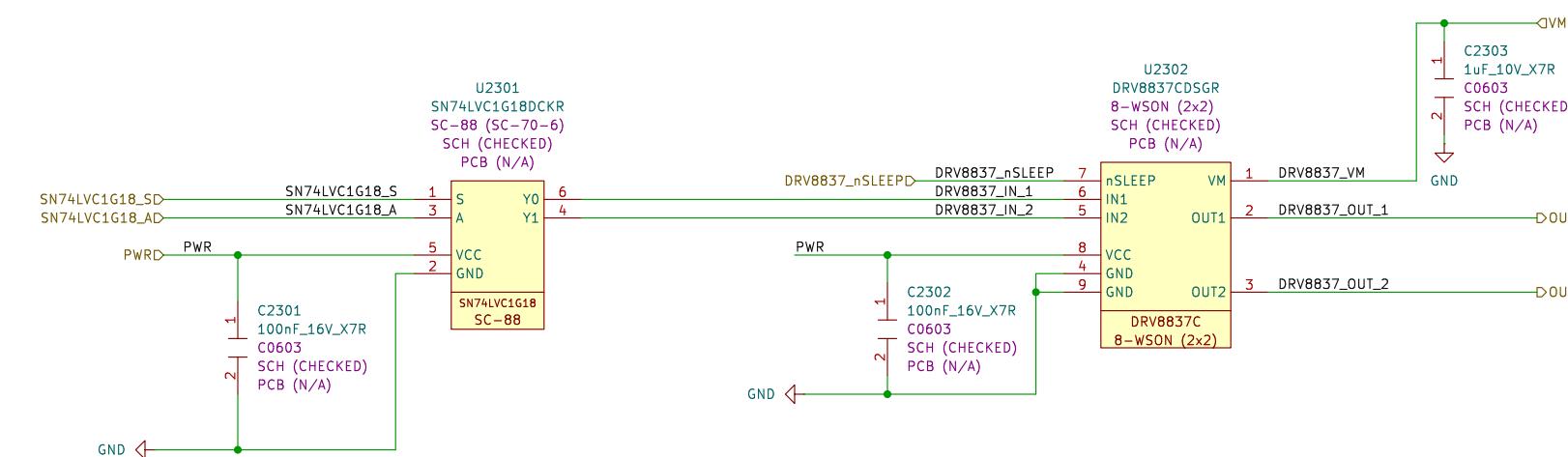


APPROVALS		PROJECT:		
ENG: Sivash Taher Parvar	2024-03-18	Quadcopter	 <b>Mendozo</b> OPEN-SOURCE DOCUMENT	
DSN: Sivash Taher Parvar	2024-03-18			
CHK: Sivash Taher Parvar	2024-03-18	PRJ VER: 01		DOC VER: 01
REFERENCE DOCUMENTS		DOC REV: 01		
TITLE:				
Motor Driver				
FILE NAME: [020110] - Motor.Driver.kicad_sch				
SCH Ref. DOC.: [020110] - Motor.Driver.kicad_sch	BOM Ref. DOC.:	GBR Ref. DOC.:	ASM Ref. DOC.:	
PCB Ref. DOC.:				
GER Ref. DOC.:				
ASW Ref. DOC.:				
SHEET 21 OF 40	SIZE: C	SCALE: 1:1	VARIANT NAME: N/A	

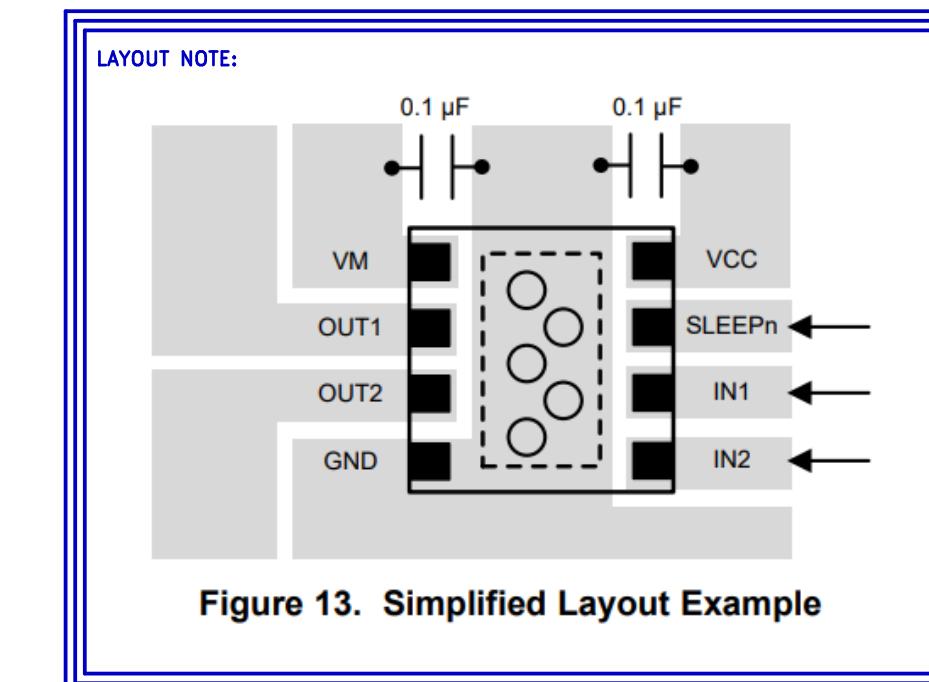
# DRV8837 Driver

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INFO:			
Table 1. Function Table			
INPUTS	OUTPUTS	Y0	Y1
L	L	L	Z
L	H	H	Z
H	L	Z	L
H	H	Z	H



INFO:					
Table 1. DRV8837C Device Logic					
nSLEEP	IN1	IN2	OUT1	OUT2	FUNCTION (DC MOTOR)
0	X	X	Z	Z	Coast
1	0	0	Z	Z	Coast
1	0	1	L	H	Reverse
1	1	0	H	L	Forward
1	1	1	L	L	Brake



APPROVALS	DATE	PROJECT: Quadcopter			Mendozo								
ENG: Siavash Taher Parvar	2024-03-18	DSN: Siavash Taher Parvar	2024-03-18	CHK: Siavash Taher Parvar									
REFERENCE DOCUMENTS													
SCH Ref. DOC.: [02011001] - DRV8837_Driver.kicad_sch	PRJ VER: 01	DOC VER: 01	DOC REV: 01										
BOM Ref. DOC.:	TITLE: DRV8837 Driver												
PCB Ref. DOC.:	FILE NAME: [02011001] - DRV8837_Driver.kicad_pcb												
GBR Ref. DOC.:	SHEET 22 OF 40												
ASM Ref. DOC.:	SIZE: C												
SCALE: 1:1													
VARIANT NAME: N/A													

# DRV8837 Driver1

CHECKED

INFO:			
Table 1. Function Table			
INPUTS	OUTPUTS	Y0	Y1
L	L	L	Z
L	H	H	Z
H	L	Z	L
H	H	Z	H

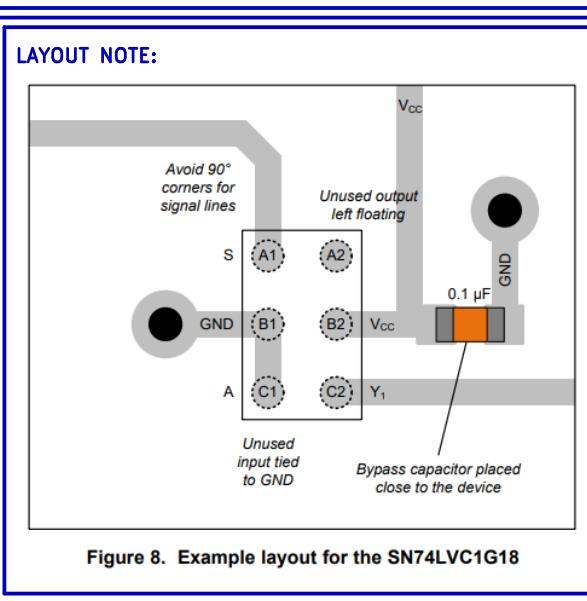
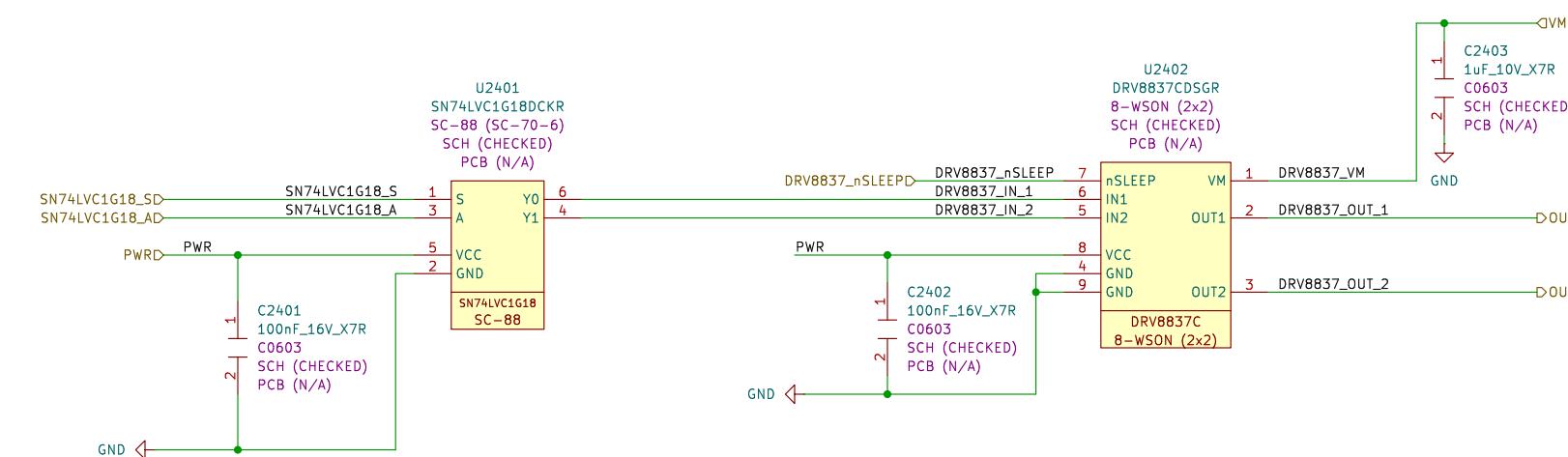


Figure 8. Example layout for the SN74LVC1G18

INFO:					
Table 1. DRV8837C Device Logic					
nSLEEP	IN1	IN2	OUT1	OUT2	FUNCTION (DC MOTOR)
0	X	X	Z	Z	Coast
1	0	0	Z	Z	Coast
1	0	1	L	H	Reverse
1	1	0	H	L	Forward
1	1	1	L	L	Brake

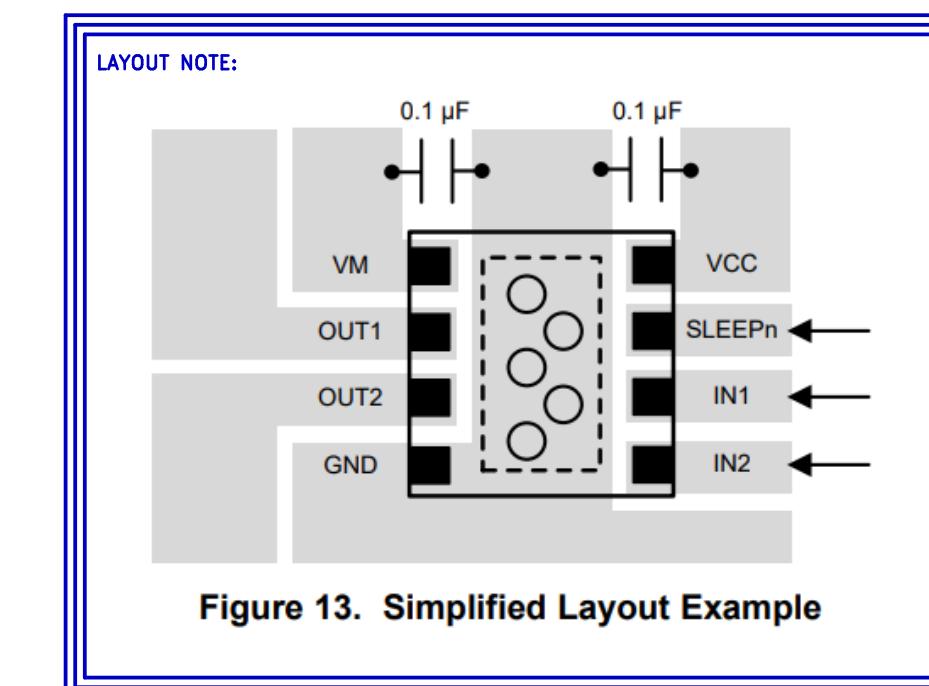


Figure 13. Simplified Layout Example

APPROVALS	DATE	PROJECT: Quadcopter			Mendozo	
ENG: Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01		
DSN: Siavash Taher Parvar	2024-03-18	REFERENCE DOCUMENTS				
CHK: Siavash Taher Parvar	2024-03-18	SCH Ref. DOC.: [02011001] - DRV8837_Driver.kicad_sch				
BOM Ref. DOC.:		BOM Ref. DOC.:				
PCB Ref. DOC.:		PCB Ref. DOC.:				
GBR Ref. DOC.:		GBR Ref. DOC.:				
ASM Ref. DOC.:		ASM Ref. DOC.:				
FILE NAME: [02011001] - DRV8837_Driver.kicad_sch						
SHEET 23 OF 40	SIZE: C	SCALE: 1:1	VARIANT NAME: N/A	OPEN-SOURCE DOCUMENT		

# DRV8837 Driver2

CHECKED

INFO:			
Table 1. Function Table			
INPUTS	OUTPUTS	Y0	Y1
L	L	L	Z
L	H	H	Z
H	L	Z	L
H	H	Z	H

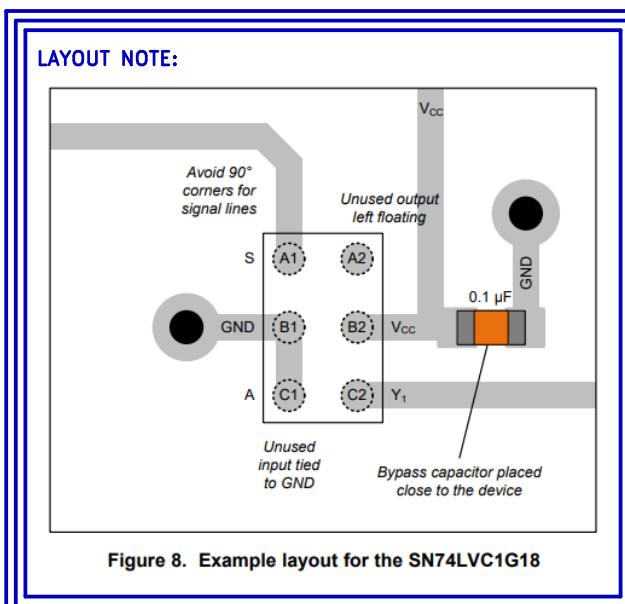
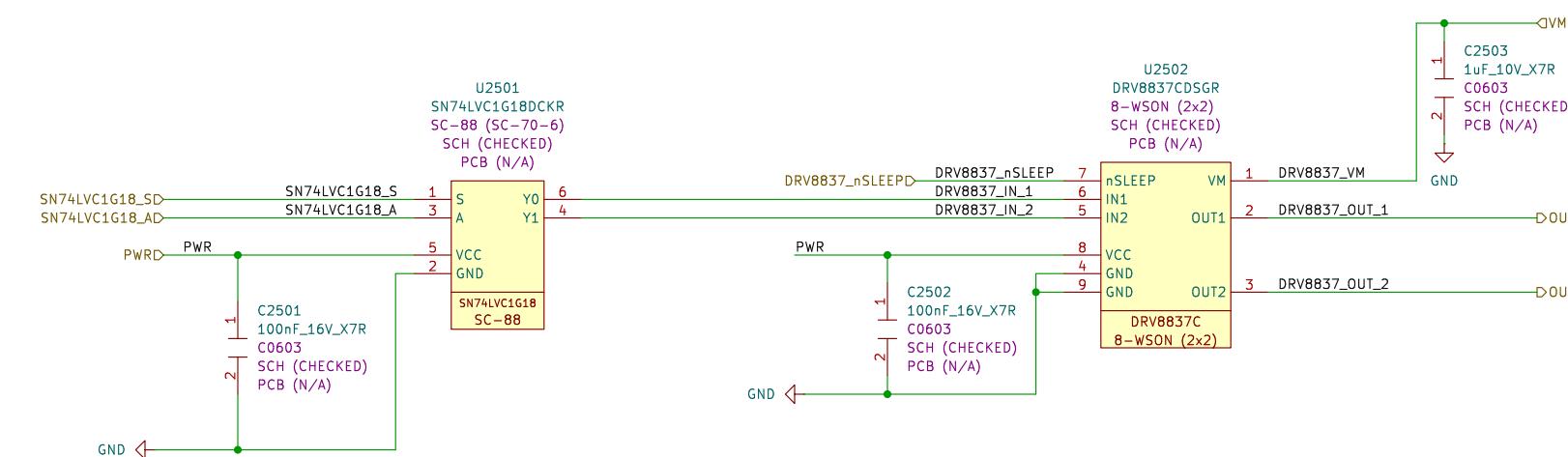


Figure 8. Example layout for the SN74LVC1G18

INFO:					
Table 1. DRV8837C Device Logic					
nSLEEP	IN1	IN2	OUT1	OUT2	FUNCTION (DC MOTOR)
0	X	X	Z	Z	Coast
1	0	0	Z	Z	Coast
1	0	1	L	H	Reverse
1	1	0	H	L	Forward
1	1	1	L	L	Brake

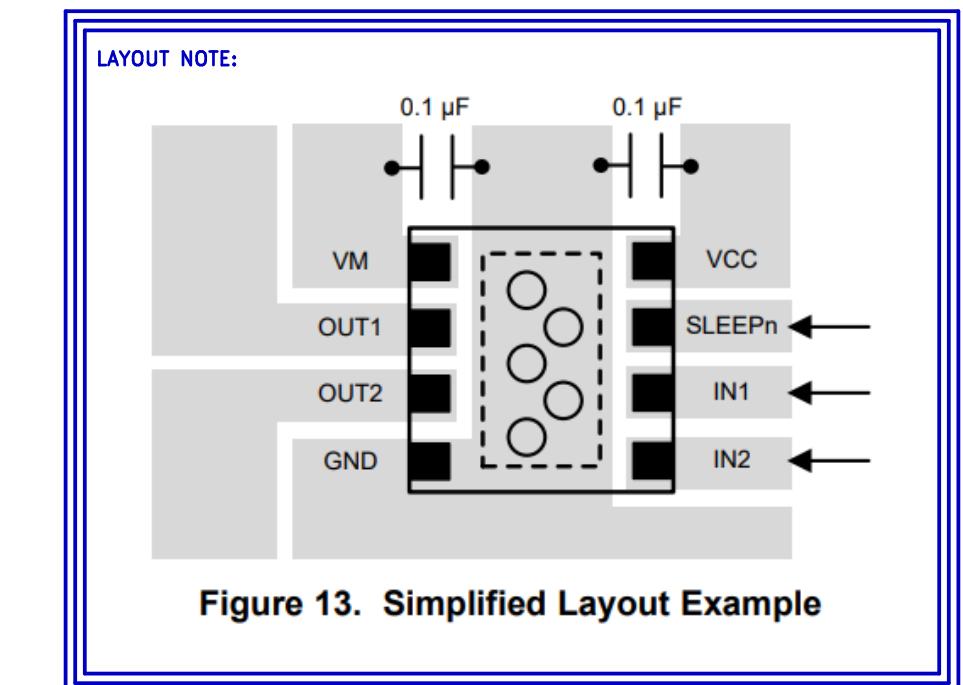


Figure 13. Simplified Layout Example

APPROVALS	DATE	PROJECT: Quadcopter			Mendozo	
ENG: Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01		
DSN: Siavash Taher Parvar	2024-03-18	REFERENCE DOCUMENTS				
CHK: Siavash Taher Parvar	2024-03-18	TITLE: DRV8837 Driver2				
BOM Ref. DOC.:	FILE NAME: [02011001] - DRV8837_Driver.kicad_sch				OPEN-SOURCE DOCUMENT	
PCB Ref. DOC.:	SCH Ref. DOC.: [02011001] - DRV8837_Driver.kicad_sch				SCALE: 1:1	
GBR Ref. DOC.:	BOM Ref. DOC.: [02011001] - DRV8837_Driver.kicad_sch				VARIANT NAME: N/A	
ASM Ref. DOC.:	FILE NAME: [02011001] - DRV8837_Driver.kicad_sch				SIZE: C	
	SHEET 24 OF 40				SCALE: 1:1	

# DRV8837 Driver3

CHECKED

INFO:			
Table 1. Function Table			
INPUTS	OUTPUTS	Y0	Y1
L	L	L	Z
L	H	H	Z
H	L	Z	L
H	H	Z	H

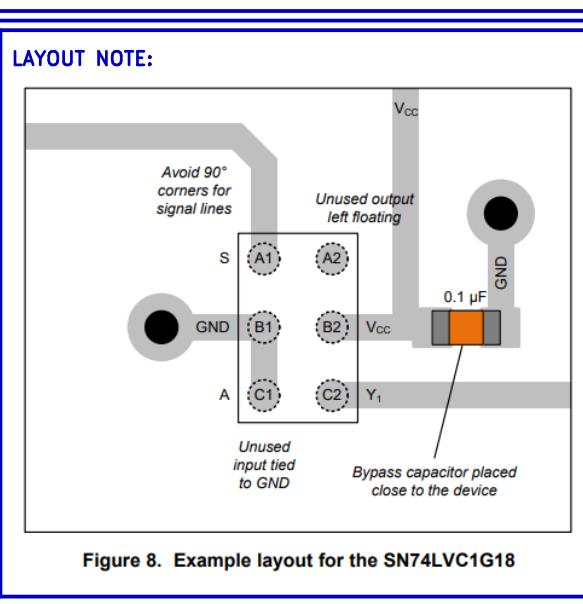
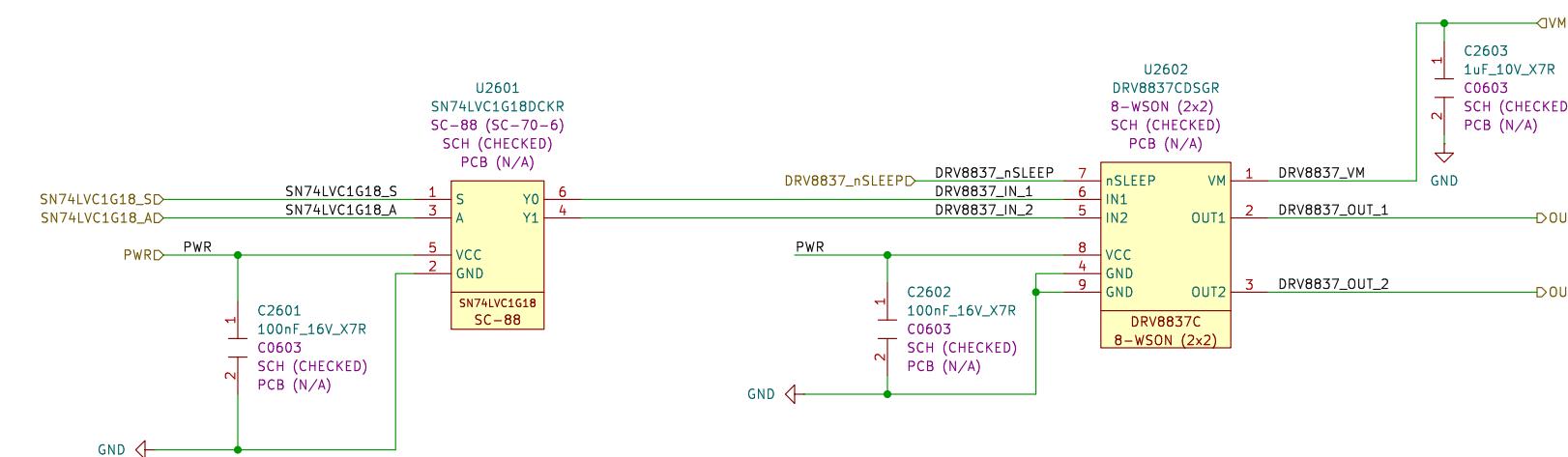


Figure 8. Example layout for the SN74LVC1G18

INFO:					
Table 1. DRV8837C Device Logic					
nSLEEP	IN1	IN2	OUT1	OUT2	FUNCTION (DC MOTOR)
0	X	X	Z	Z	Coast
1	0	0	Z	Z	Coast
1	0	1	L	H	Reverse
1	1	0	H	L	Forward
1	1	1	L	L	Brake

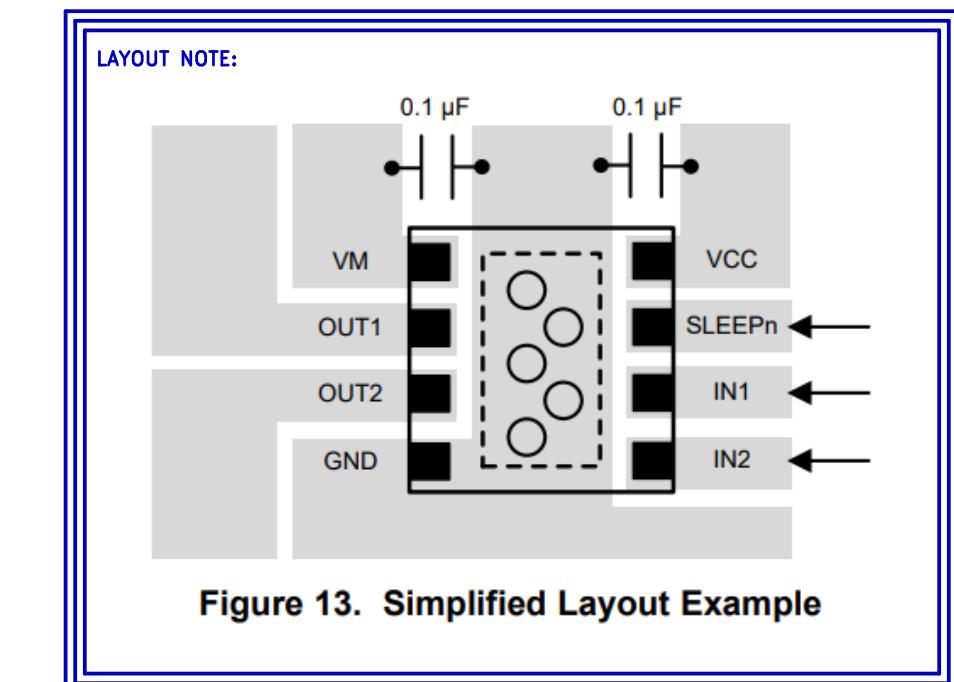


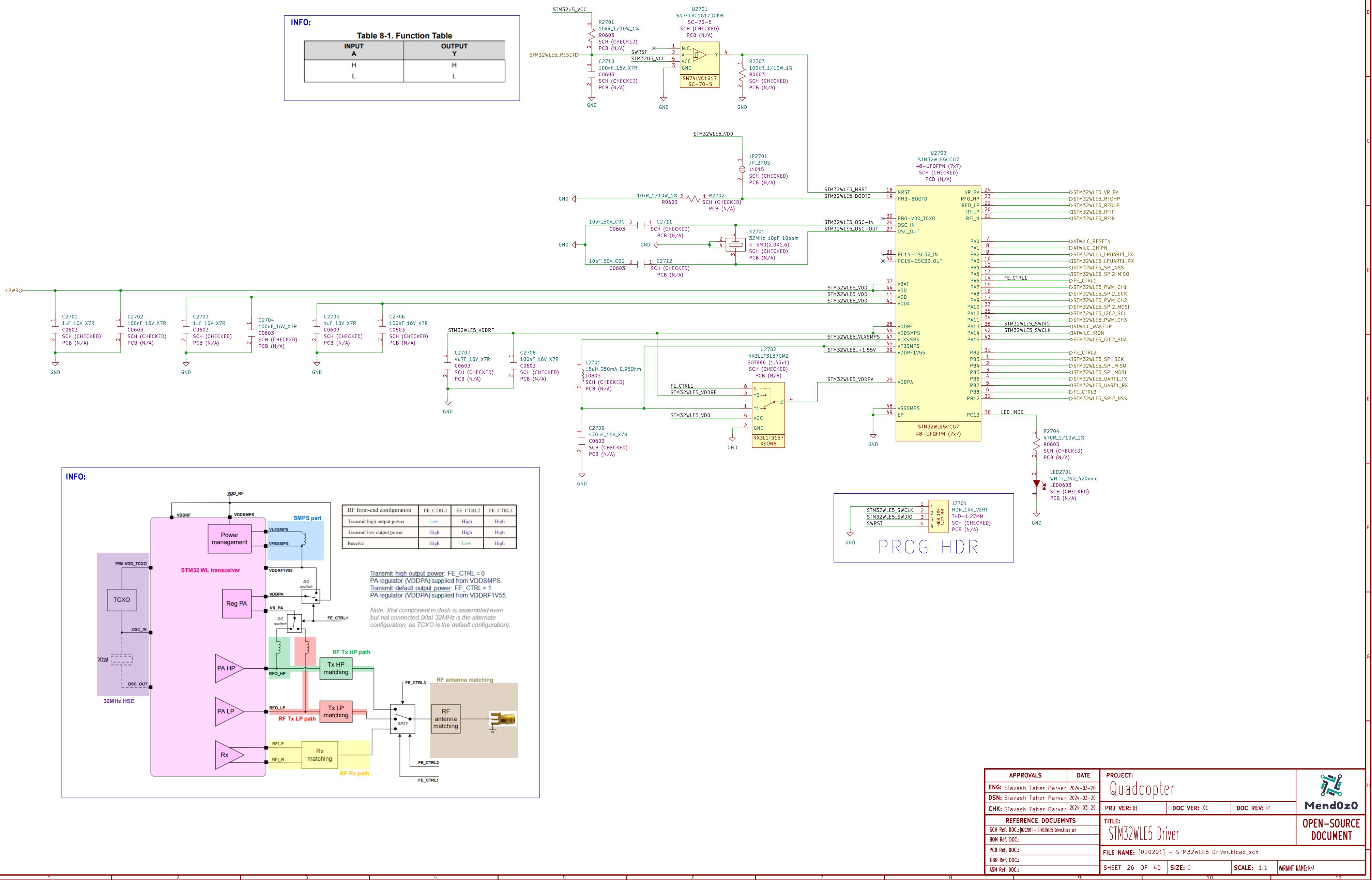
Figure 13. Simplified Layout Example

APPROVALS	DATE	PROJECT: Quadcopter			Mendozo	
ENG: Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01		
DSN: Siavash Taher Parvar	2024-03-18	REFERENCE DOCUMENTS				
CHK: Siavash Taher Parvar	2024-03-18	SCH Ref. DOC.: [02011001] - DRV8837.Driver.kicad_sch				
BOM Ref. DOC.:		TITLE: DRV8837 Driver3				
PCB Ref. DOC.:		FILE NAME: [02011001] - DRV8837.Driver.kicad_pcb				
GBR Ref. DOC.:		SCALE: 1:1				
ASM Ref. DOC.:		SHEET 25 OF 40	SIZE: C	VARIANT NAME: N/A		

# STM32WLE5 Driver

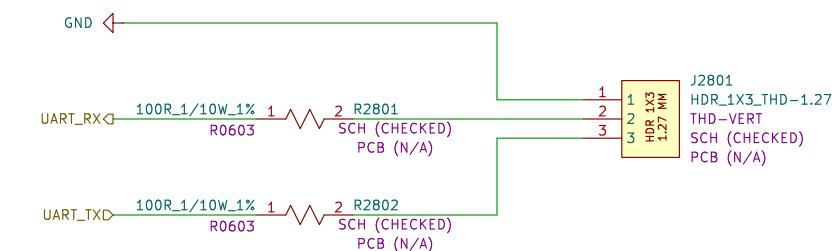
CHECKED

INFO:	
Table 8-1. Function Table	
INPUT A	OUTPUT Y
H	H
L	L



# DEBUG UART

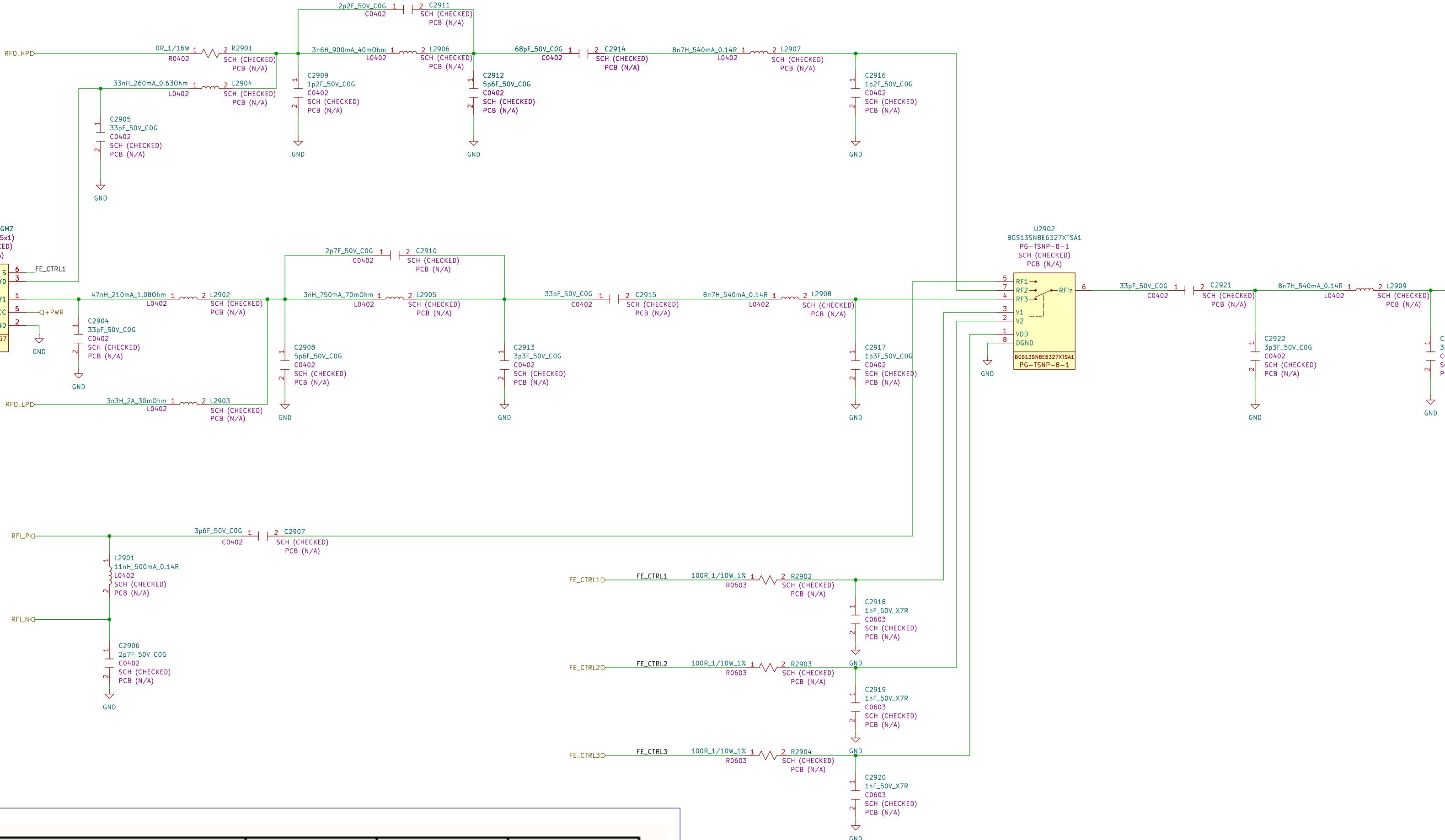
CHECKED



APPROVALS		DATE	PROJECT:				
ENG:	Siavash Taher Parvar	2024-03-18	Quadcopter				
DSN:	Siavash Taher Parvar	2024-03-18					
CHK:	Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01		
REFERENCE DOCUMENTS		TITLE:			OPEN-SOURCE DOCUMENT		
SCH Ref. DOC.:	[02020] - DEBUG_UART.kicad_sch	DEBUG UART			Mendozo		
BOM Ref. DOC.:							
PCB Ref. DOC.:							
GBR Ref. DOC.:							
ASM Ref. DOC.:							
FILE NAME: [02020] - DEBUG_UART.kicad_sch		SCALE: 1:1			VARIANT NAME: N/A		
SHEET 27 OF 40		SIZE: C					

# Antenna Driver

**CHECKED**



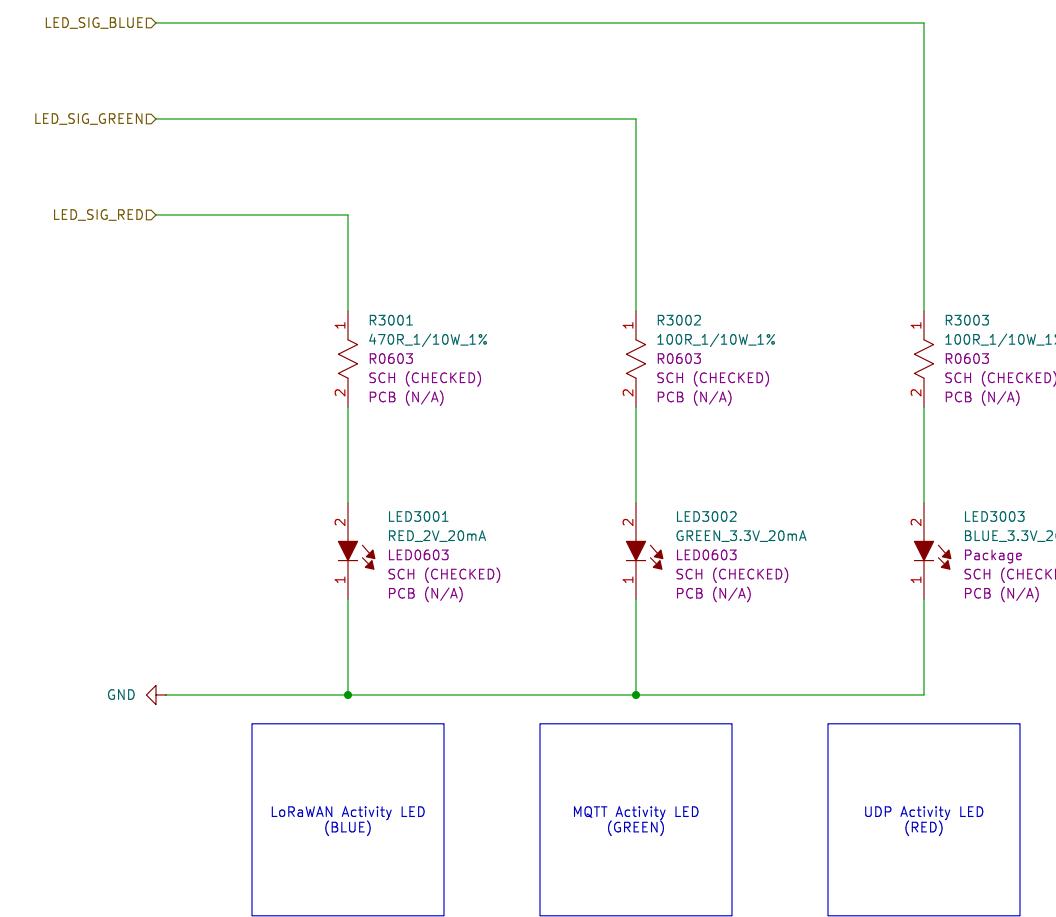
**INFO:**

RF front-end configuration	FE_CTRL1	FE_CTRL2	FE_CTRL3
Transmit high output power	Low	High	High
Transmit low output power	High	High	High
Receive	High	Low	High

APPROVALS		DATE	PROJECT: Quadcopter			
ENG: Sivash Taher Parvar		2024-03-20	PRJ VER: 01	DOC VER: 01	DOC REV: 01	
DSN: Sivash Taher Parvar		2024-03-20				
CHK: Sivash Taher Parvar		2024-03-20				
REFERENCE DOCUMENTS						
SCH Ref. DOC.: [020203] - Antenna Driver.kicad_sch						
BOM Ref. DOC.:						
PCB Ref. DOC.:						
GBR Ref. DOC.:						
ASM Ref. DOC.:						
FILE NAME: [020203] - Antenna Driver.kicad_sch						
SHEET 28	OF 40	SIZE: C	SCALE: 1:1	VARIANT: N/A		

# Activity LEDs Driver

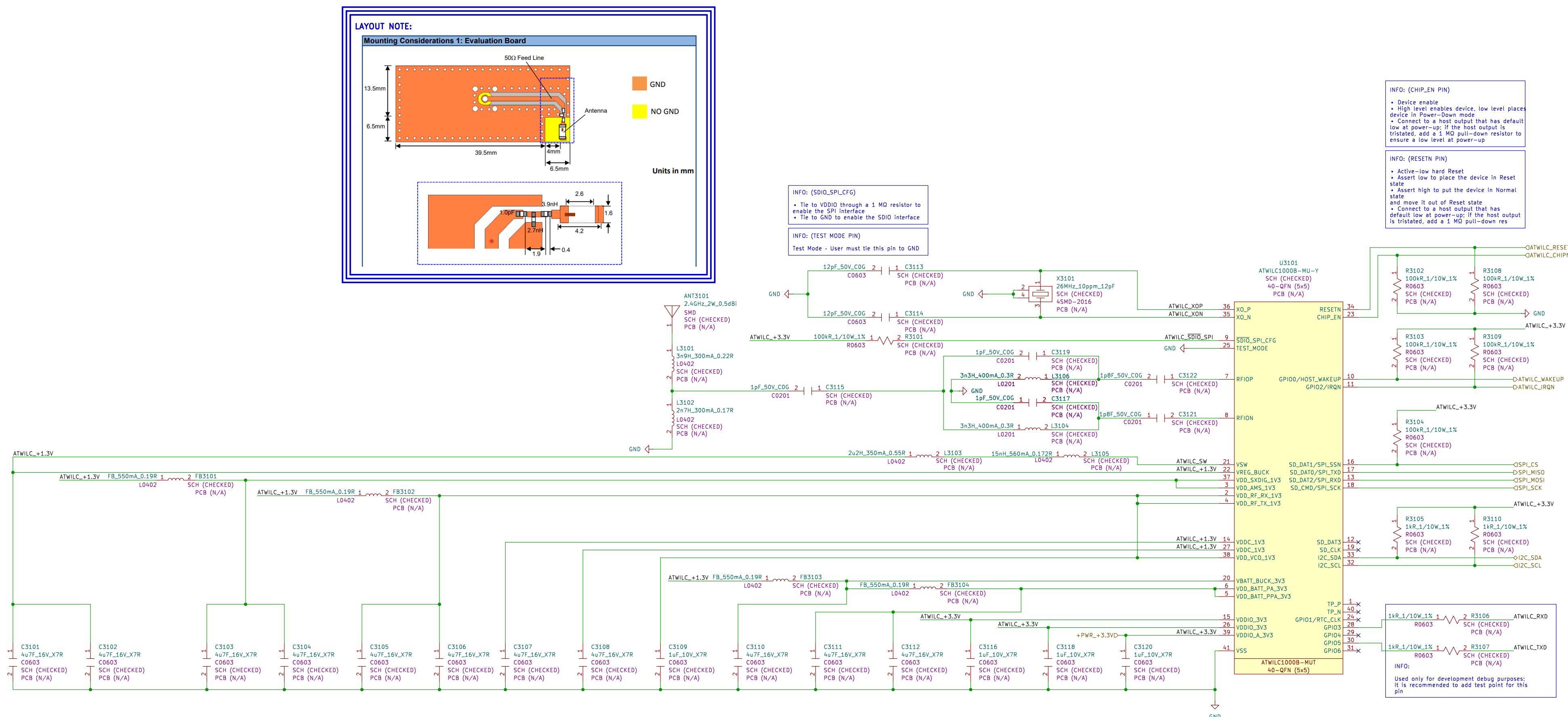
CHECKED



APPROVALS		DATE	PROJECT:		
ENG:	Siavash Taher Parvar	2024-03-18	Quadcopter		
DSN:	Siavash Taher Parvar	2024-03-18			
CHK:	Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01
REFERENCE DOCUMENTS		TITLE:			
SCH Ref. DOC.:	(0204) - Activity LEDs Driver.kicad_sch	Activity LEDs Driver			
BOM Ref. DOC.:		FILE NAME: [0204] - Activity LEDs Driver.kicad_sch			
PCB Ref. DOC.:		SCALE: 1:1			
GBR Ref. DOC.:		VARIANT NAME: N/A			
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Mendoza					
OPEN-SOURCE DOCUMENT					

# ATWIL1000C Driver

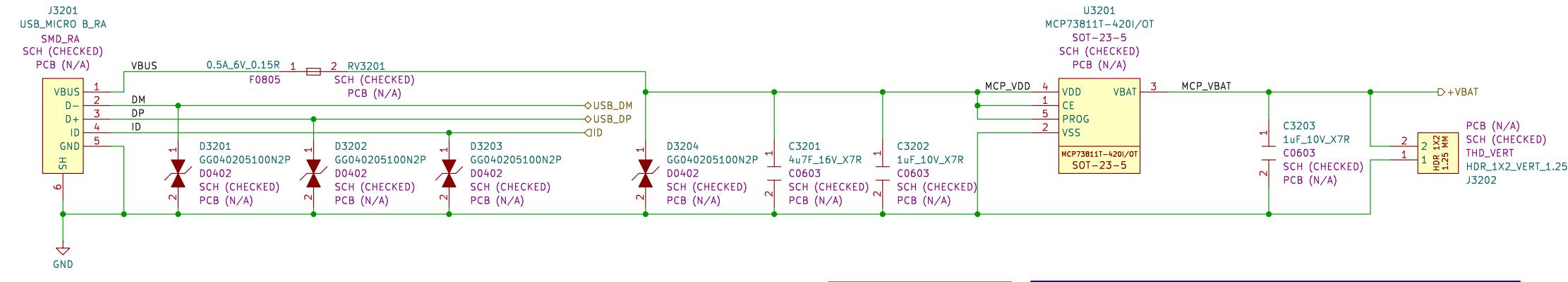
# CHECKED



APPROVALS	DATE	PROJECT: Quadcopter			 <b>Mendoza</b>			
ENG: Siavash Taher Parvar	2024-03-20							
DSN: Siavash Taher Parvar	2024-03-20							
CHK: Siavash Taher Parvar	2024-03-20	PRJ VER: 01	DOC VER: 01	DOC REV: 01				
REFERENCE DOCUMENTS		TITLE: ATWIL1000C Driver			OPEN-SOURCE DOCUMENT			
SCH Ref. DOC.: [020205] – ATWIL1000C Driver.kicad.sch								
BOM Ref. DOC.:								
PCB Ref. DOC.:	FILE NAME: [020205] – ATWIL1000C Driver.kicad_sch							
GBR Ref. DOC.:								
ASM Ref. DOC.:	SHEET 30 OF 40   SIZE: C   SCALE: 1:1   VARIANT NAME: N/A							

# BATTERY CHARGER

CHECKED



**INFO:**  
For the MCP73811, the current regulation set input (PROG) functions as a digital input. A logic Low enables battery charging; a logic High selects a 450 mA charge current; a logic High enables battery charging. A logic Low disables battery charging. The charge enable input is compatible with 1.8V logic.

**INFO:**  
A logic High enables battery charging; a logic Low disables battery charging. The charge enable input is compatible with 1.8V logic.

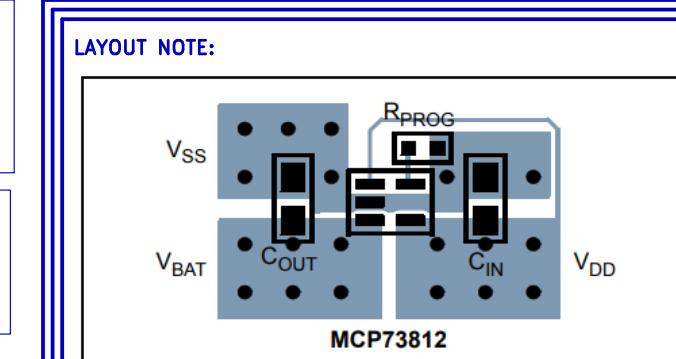


FIGURE 6-3: Typical Layout (Top).

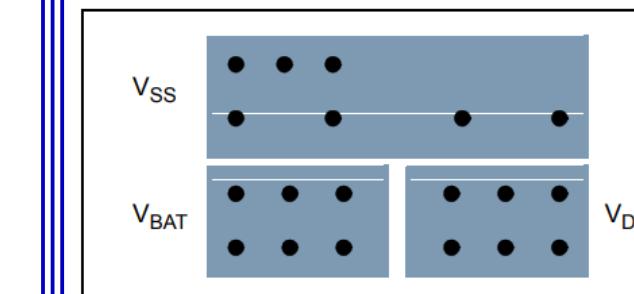
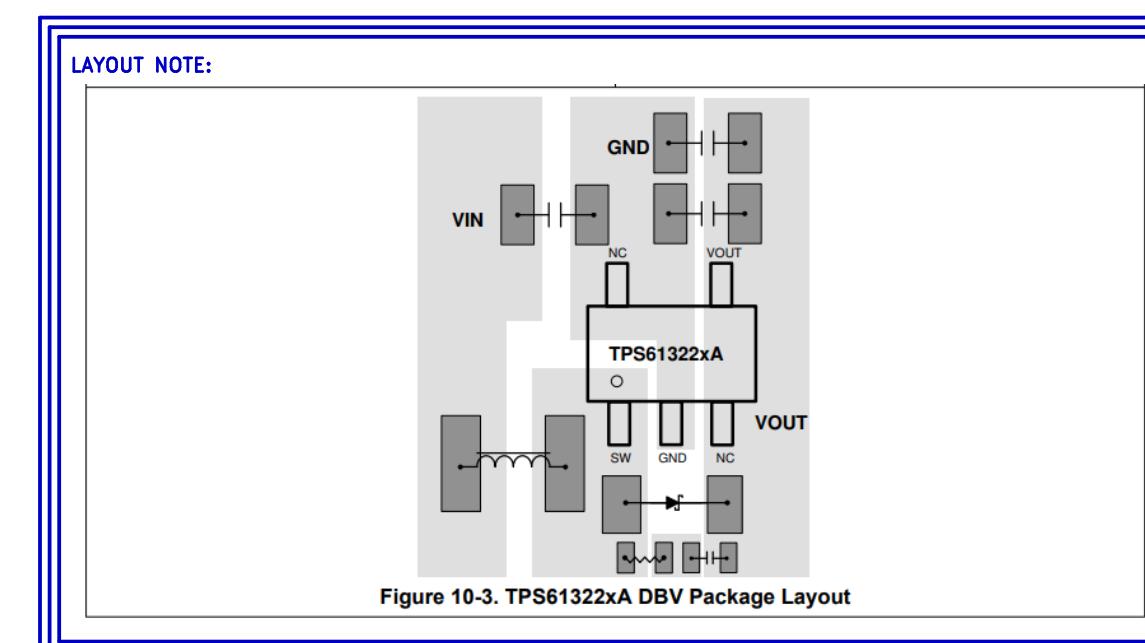
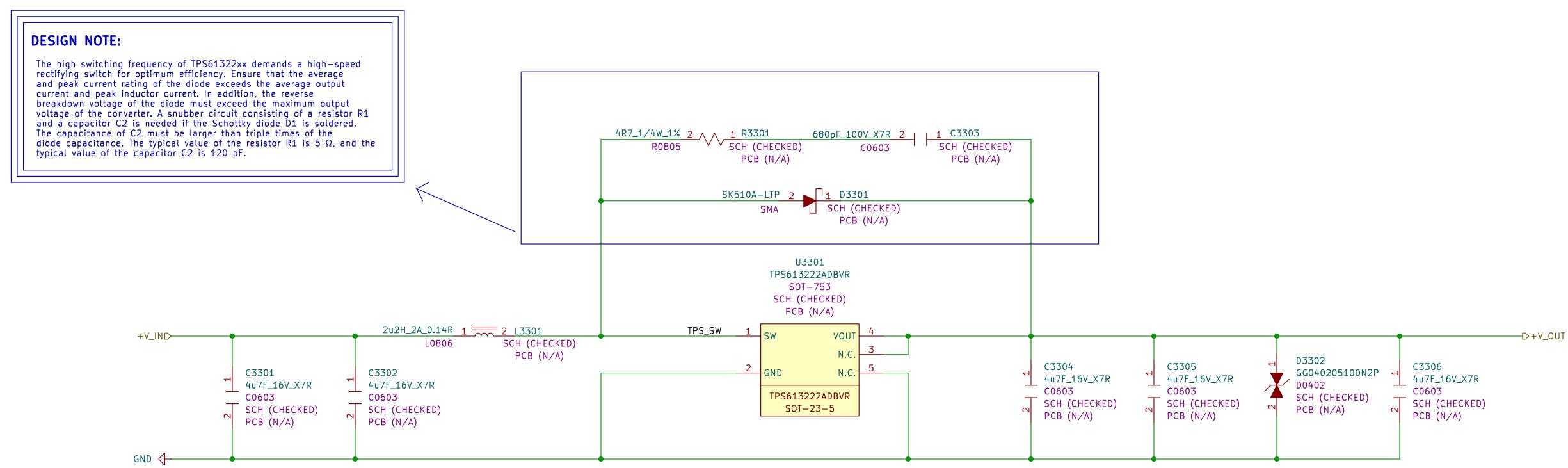


FIGURE 6-4: Typical Layout (Bottom).

APPROVALS		DATE	PROJECT: Quadcopter			
ENG: Sivash Taher Parvar		2024-03-18				
DSN: Sivash Taher Parvar		2024-03-18	PRJ VER: 01			
CHK: Sivash Taher Parvar		2024-03-18	DOC VER: 01			
DOC REV: 01			TITLE: BATTERY CHARGER			
REFERENCE DOCUMENTS			FILE NAME: [020301] - BATTERY CHARGER.kicad_sch			
SCH Ref. DOC.: [020301] - BATTERY CHARGER.kicad_sch			SCALE: 1:1			
PCB Ref. DOC.: [020301] - BATTERY CHARGER.kicad_pcb			VARIANT NAME: N/A			
GBR Ref. DOC.: [020301] - BATTERY CHARGER.kicad_gbr						
ASM Ref. DOC.: [020301] - BATTERY CHARGER.kicad_asm						
SHEET 31 OF 40	SIZE: C					

# SMPS DCDC-BOOST +5V

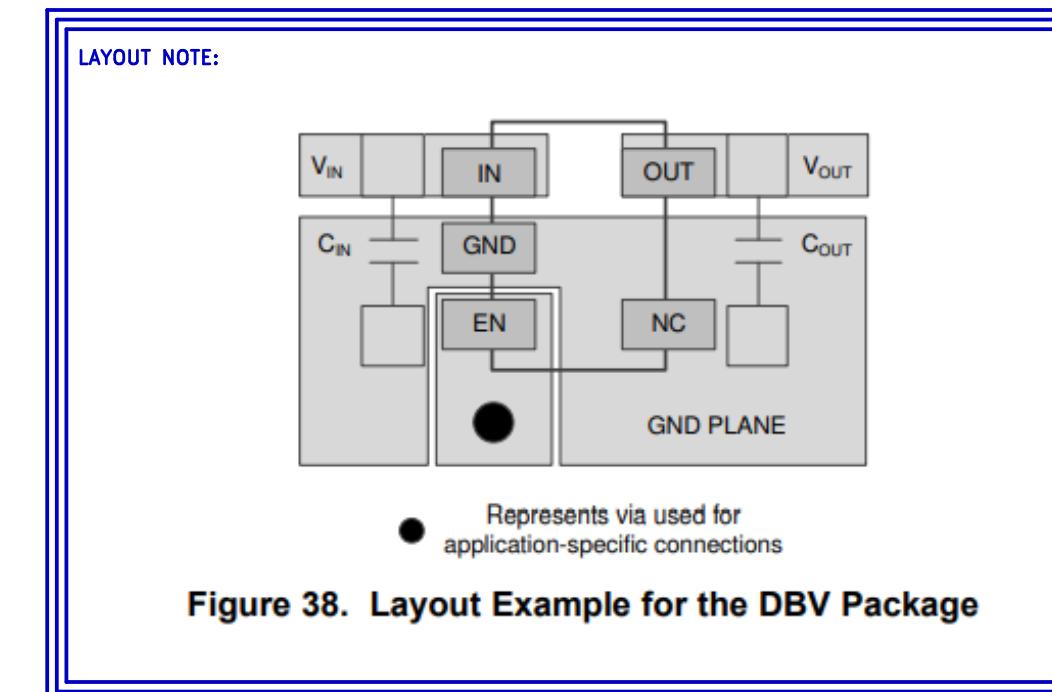
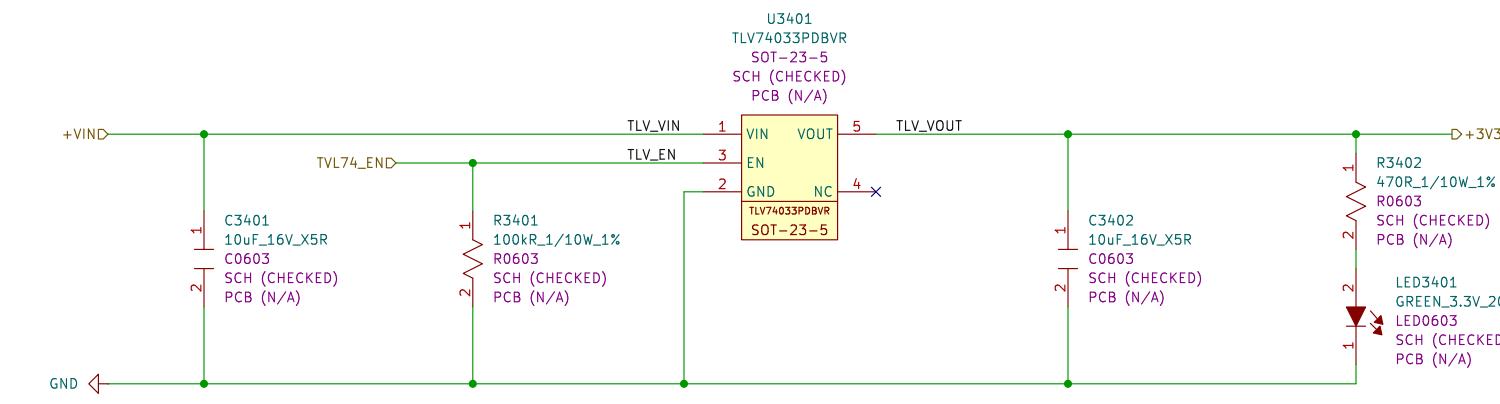
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APPROVALS		DATE	PROJECT:		
ENG:	Siavash Taher Parvar	2024-03-18	Quadcopter		
DSN:	Siavash Taher Parvar	2024-03-18			
CHK:	Siavash Taher Parvar	2024-03-18	PRJ VER: 01	DOC VER: 01	DOC REV: 01
REFERENCE DOCUMENTS			Mendozo		
SCH Ref. DOC.:	[020302] - SMPS DCDC-BOOST +5V.kicad.sch			TITLE:	
BOM Ref. DOC.:				SMPS DCDC-BOOST +5V	
PCB Ref. DOC.:				FILE NAME: [020302] - SMPS DCDC-BOOST +5V.kicad_sch	
GBR Ref. DOC.:					
ASM Ref. DOC.:				SHEET 32 OF 40	SIZE: C
				SCALE: 1:1	VARIANT NAME: N/A

# LDO +3V3

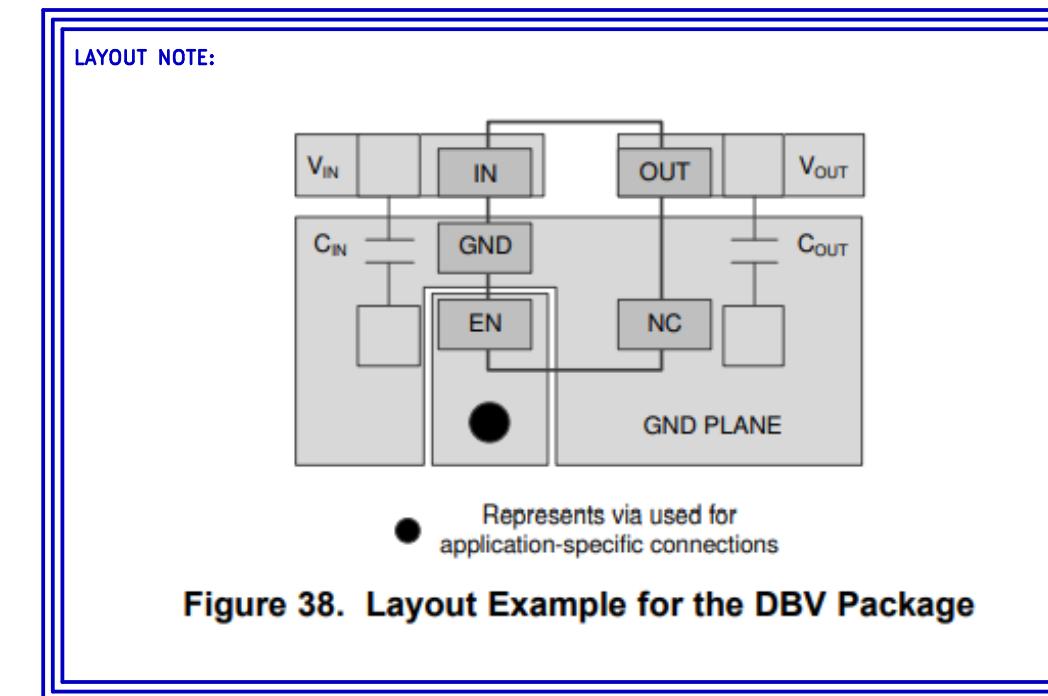
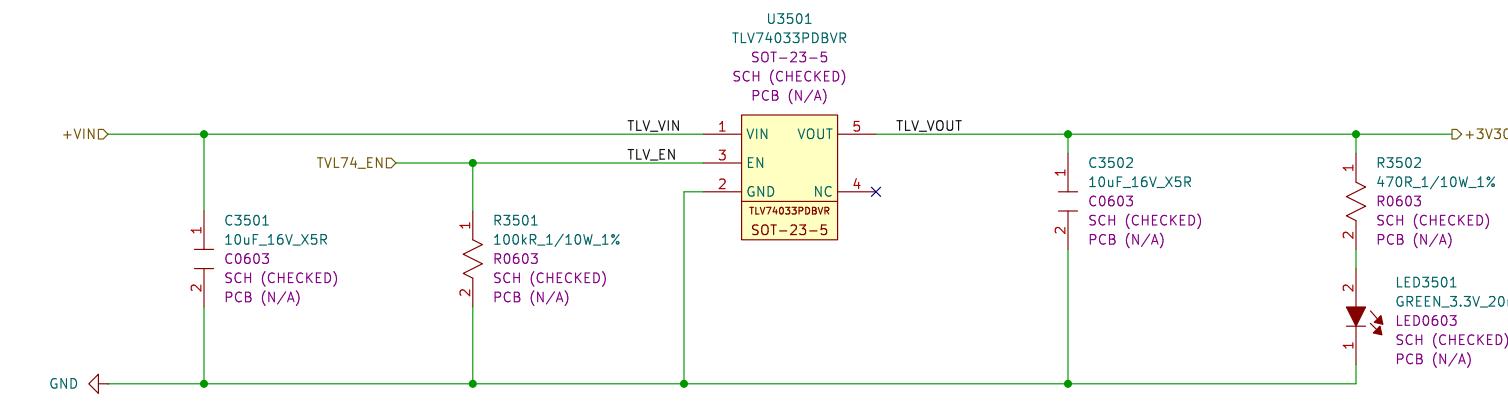
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APPROVALS		DATE	PROJECT: Quadcopter				
ENG: Siavash Taher Parvar	2024-03-18	DSN: Siavash Taher Parvar	2024-03-18	CHK: Siavash Taher Parvar	2024-03-18		
PRJ VER: 01			DOC VER: 01	DOC REV: 01			
REFERENCE DOCUMENTS			TITLE: LDO +3V3				
SCH Ref. DOC.: [020303] - LDO +3V3.kicad_sch	BOM Ref. DOC.:	PCB Ref. DOC.:	GBR Ref. DOC.:	ASM Ref. DOC.:	FILE NAME: [020303] - LDO +3V3.kicad_sch		
SHEET 33 OF 40			SIZE: C	SCALE: 1:1	VARIANT NAME: N/A	OPEN-SOURCE DOCUMENT	

# LDO +3V3\_1

**PRELIMINARY**



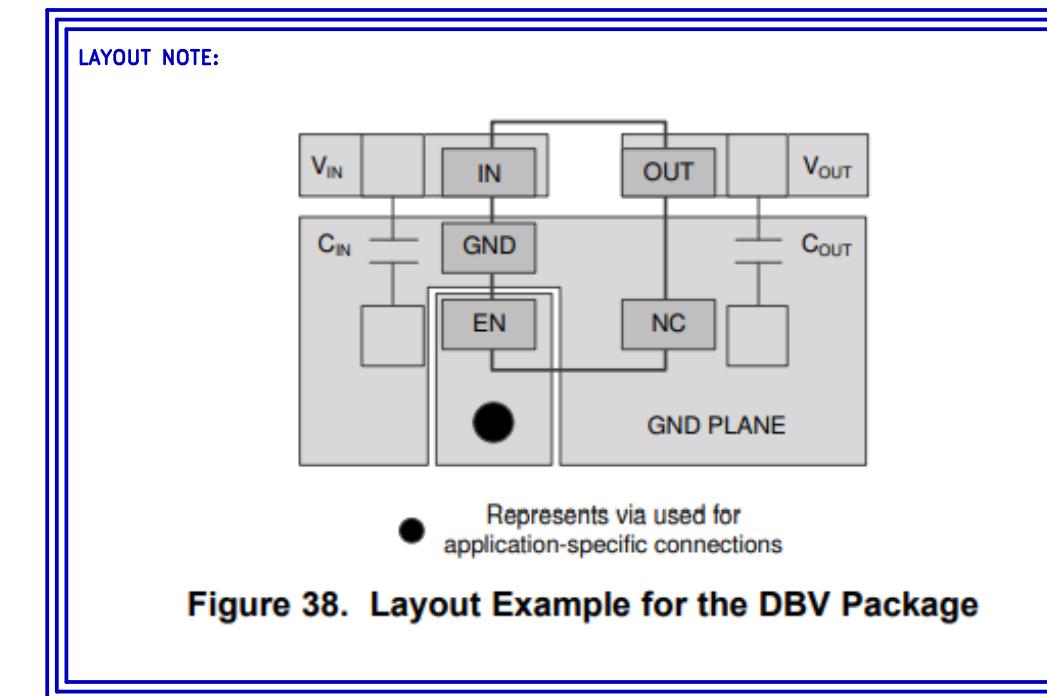
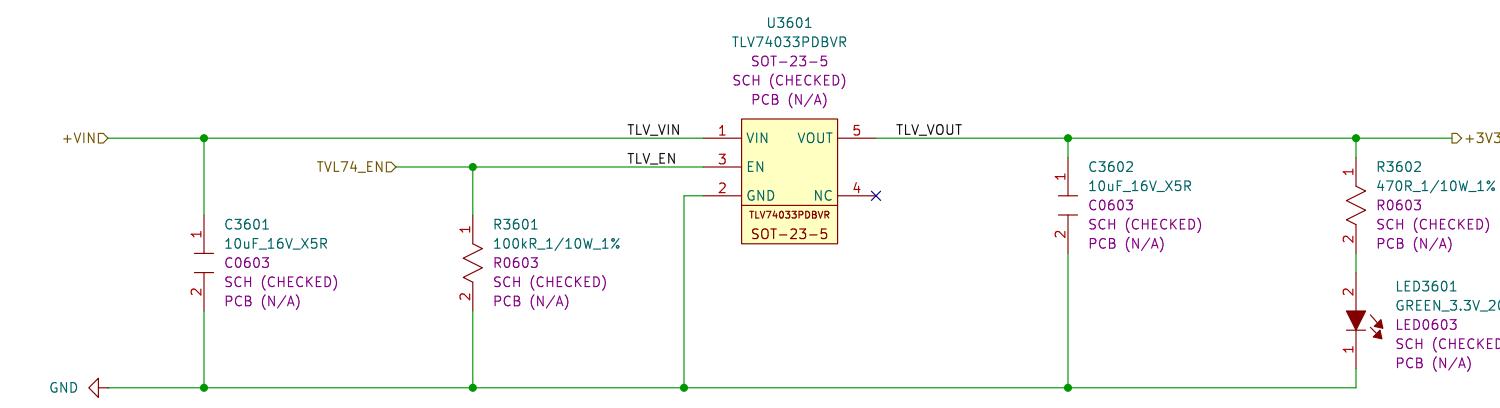
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ENG: Siavash Taher Parvar	2024-03-17	Quadcopter	
DSN: Siavash Taher Parvar	2024-03-17		
CHK: Siavash Taher Parvar	2024-03-17	PRJ VER: 01	DOC VER: 01
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SCH Ref. DOC.: [020304] - LDO +3V3.kicad_sch		FILE NAME: [020304] - LDO +3V3.kicad_sch	
BOM Ref. DOC.:		SHEET: 34 OF 40	
PCB Ref. DOC.:		SIZE: C	SCALE: 1:1
GBR Ref. DOC.:		VARIANT NAME: N/A	
ASM Ref. DOC.:			



**Mendoza**  
OPEN-SOURCE  
DOCUMENT

# LDO +3V3\_2

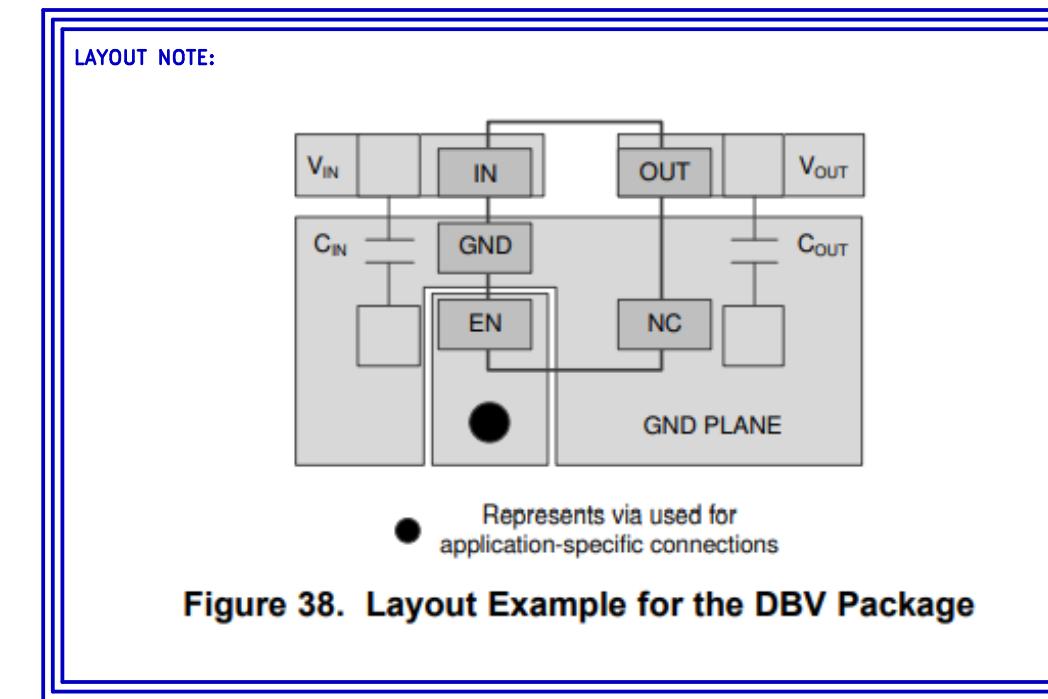
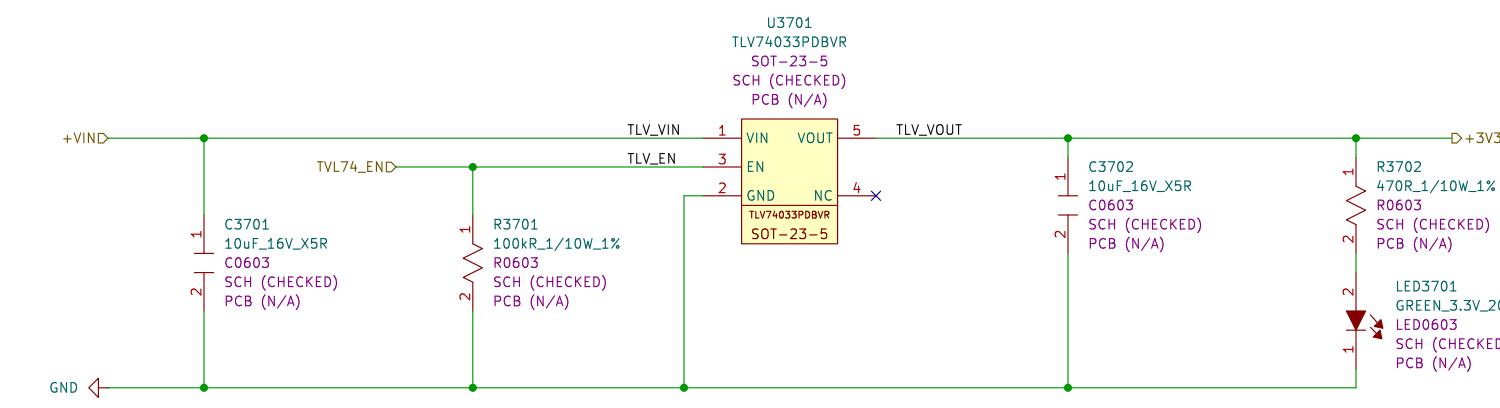
**PRELIMINARY**



APPROVALS		PROJECT:	
ENG: Siavash Taher Parvar	2024-03-17	Quadcopter	
DSN: Siavash Taher Parvar	2024-03-17		
CHK: Siavash Taher Parvar	2024-03-17	PRJ VER: 01	DOC VER: 01
REFERENCE DOCUMENTS		TITLE:	
SCH Ref. DOC.: [020305] - LDO +3V3.kicad_sch		LDO +3V3_2	
BOM Ref. DOC.:		FILE NAME: [020305] - LDO +3V3.kicad_sch	
PCB Ref. DOC.:		SHEET 35 OF 40	
GBR Ref. DOC.:		SIZE: C	SCALE: 1:1
ASM Ref. DOC.:		VARIANT NAME: N/A	
Mendozo			OPEN-SOURCE DOCUMENT

# LDO +3V3\_3

**PRELIMINARY**



APPROVALS		PROJECT:	
ENG: Siavash Taher Parvar	2024-03-17	Quadcopter	
DSN: Siavash Taher Parvar	2024-03-17		
CHK: Siavash Taher Parvar	2024-03-17	PRJ VER: 01	DOC VER: 01
REFERENCE DOCUMENTS		TITLE: LDO +3V3_3	
SCH Ref. DOC.: [020306] - LDO +3V3.kicad_sch		FILE NAME: [020306] - LDO +3V3.kicad_sch	
BOM Ref. DOC.:		SHEET 36 OF 40	
PCB Ref. DOC.:		SIZE: C	SCALE: 1:1
GBR Ref. DOC.:		VARIANT NAME: N/A	
ASM Ref. DOC.:			



OPEN-SOURCE  
DOCUMENT

# MECHANICAL PARTS

# PRELIMINARY

4xLED 5MM BLUE  
4xLED HOLDER BLACK 5MM (FIND THE LINK FROM AMAZON)

1 m WIRE  
4xJST 1.27mm FEMALE HEADER

1xBATTERY 3.7V

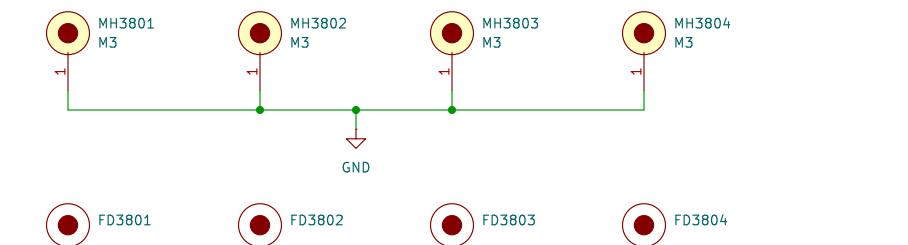
1xFRAME  
4xCORELESS MOTORS 0716  
4xpropeller  
4xM3x3MM STAND OFF  
4xM3 PHILLIPS SCREW  
4xM3 NUTS

1xPCB 50x50 MM2 4LAYERS IMPEDANCE CONTROLLED

1x OV2640 CAMERA MODULE

1xPush button (FIND LINK FROM AMAZON)

1x Antenna for LoRa



TXT3801

APPROVALS		PROJECT:		Mendoza	
ENG:	DATE	Quadcopter			
DSN:	2024-03-17	PRJ VER:	01		
CHK:	Siavash Taher Parvar 2024-03-17	DOC VER:	01		
REFERENCE DOCUMENTS		TITLE:			
SCH Ref. DOC.: [03] - MECHANICAL PARTS.kicad_sch	BOM Ref. DOC.:	MECHANICAL PARTS			
PCB Ref. DOC.:	GBR Ref. DOC.:	FILE NAME: [03] - MECHANICAL PARTS.kicad_sch			
ASM Ref. DOC.:		SHEET 37 OF 40	SIZE: C	SCALE: 1:1	
		VARIANT NAME: N/A			

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PROBABLE FAILURE OR INJURY

REVISION	DESCRIPTION	DATE	APPROVED
01	First Version	2024-03-17	Siavash Taher Parvar

# Power Sequence

PRELIMINARY

APPROVALS	DATE	PROJECT:	OPEN-SOURCE DOCUMENT
ENG: Siavash Taher Parvar	2024-03-17	Quadcopter	
DSN: Siavash Taher Parvar	2024-03-17		
CHK: Siavash Taher Parvar	2024-03-17	PRJ VER: 01	DOC VER: 01
REFERENCE DOCUMENTS		TITLE:	OPEN-SOURCE DOCUMENT
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BOM Ref. DOC.:			
PCB Ref. DOC.:		FILE NAME: [04] - Power Sequence.kicad_sch	
GBR Ref. DOC.:			
ASM Ref. DOC.:		SHEET 38 OF 40	SCALE: 1:1
		SIZE: C	VARIANT NAME: N/A

THIS DOCUMENT AND THE DATA DISCLOSED  
HEREIN OR HEREWITH ARE ALL OPEN-SOURCE  
AND THERE IS NO RESPONSIBILITY FOR  
PROBABLE FAILURE OR INJURY

REVISION	DESCRIPTION	DATE	APPROVED
01	First Version	2024-03-17	Siavash Taher Parvar

# Revision History

PRELIMINARY

APPROVALS	DATE	PROJECT:	OPEN-SOURCE DOCUMENT
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DSN: Siavash Taher Parvar	2024-03-17		
CHK: Siavash Taher Parvar	2024-03-17	PRJ VER: 01	DOC VER: 01
REFERENCE DOCUMENTS		TITLE:	OPEN-SOURCE DOCUMENT
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BOM Ref. DOC.:			
PCB Ref. DOC.:			
GBR Ref. DOC.:			
ASM Ref. DOC.:			
FILE NAME: [05] - Revision History.kicad_sch			
SHEET 39 OF 40	SIZE: C	SCALE: 1:1	VARIANT NAME: N/A