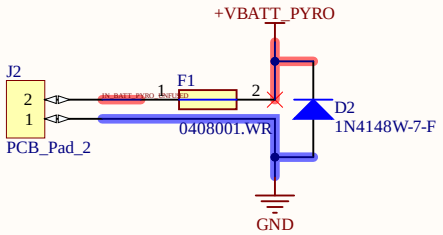
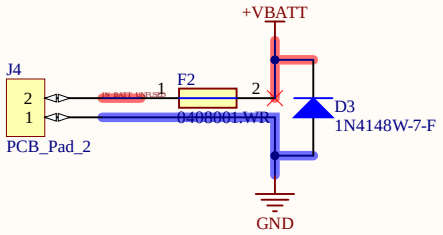


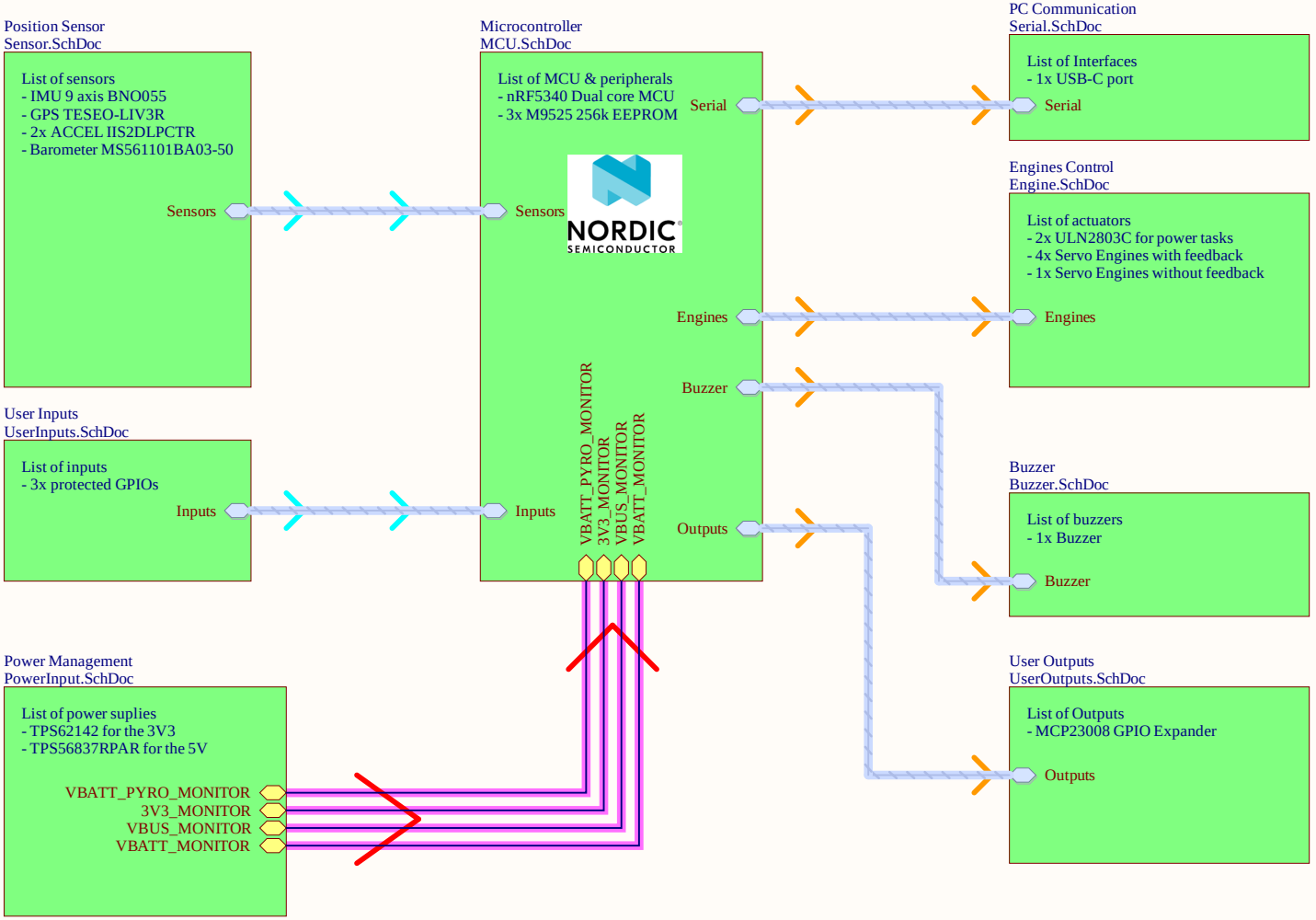


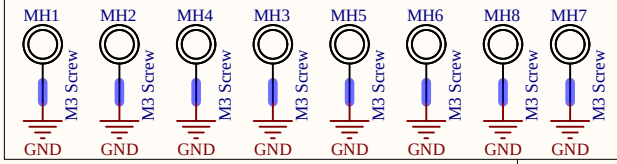
2x 9V battery for the whole project.

One is for the Pyro triggering, the other is for powering the MCU + Position servos

1A slow blow fuses
-Nominal current = 250 / 300 mA for the VBATT
-Nominal current = 2A for < 2s for the VBAT PYRO (200% of fuse = ~20s manufacturer).

Diodes for reverse polarity (trigger the fuses).





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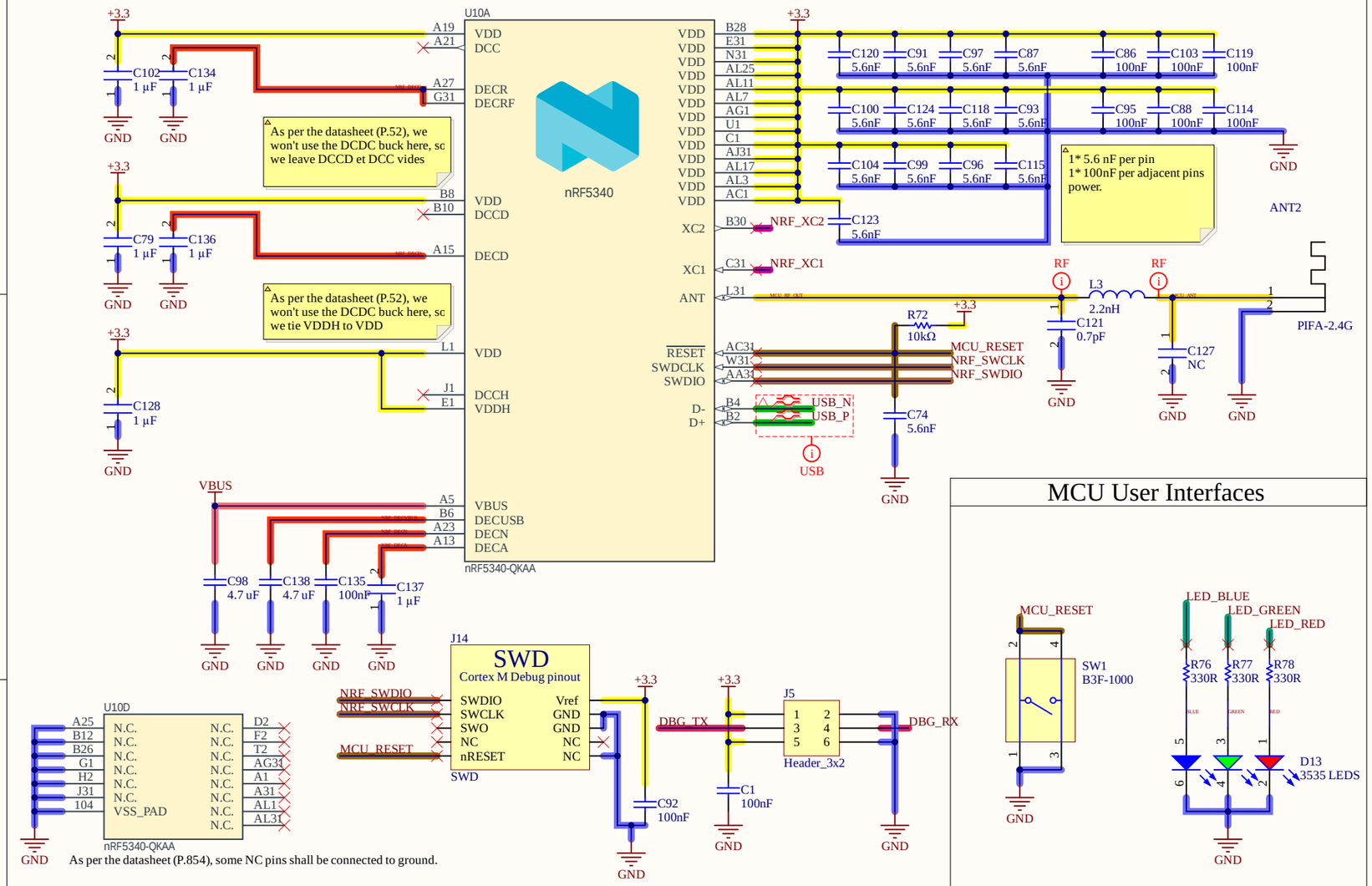
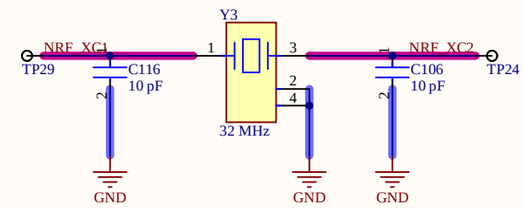
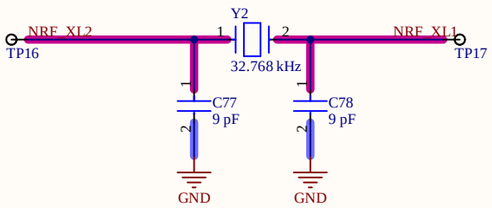
MCU Power + SWD Programmation



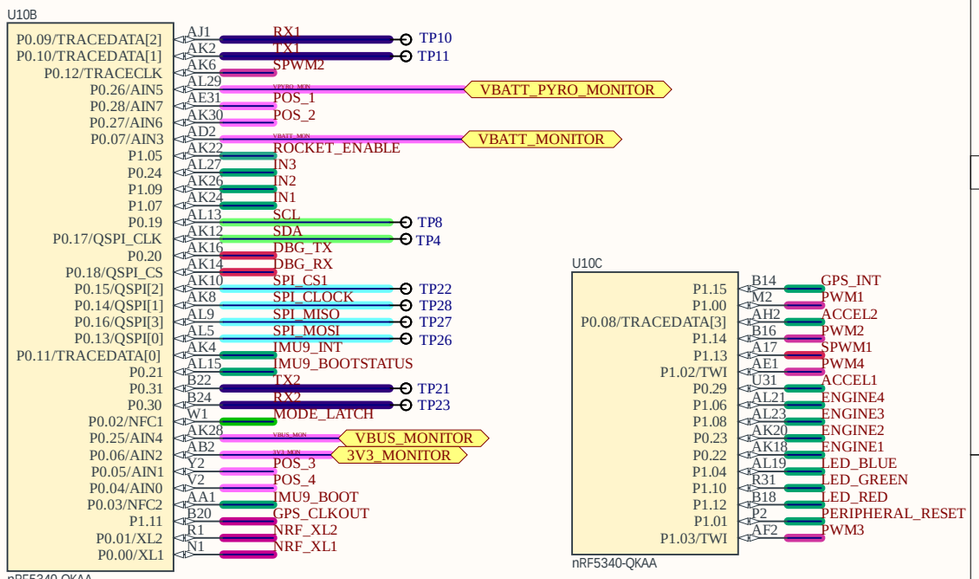
MCU User Interfaces

MCU Clocks

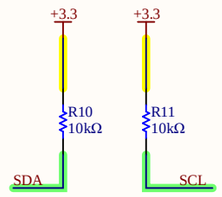




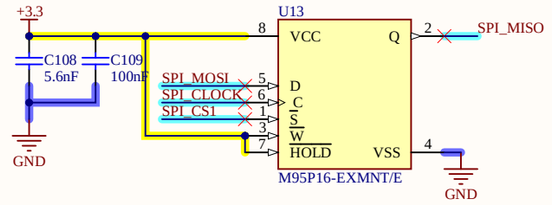
MCU GPIOS



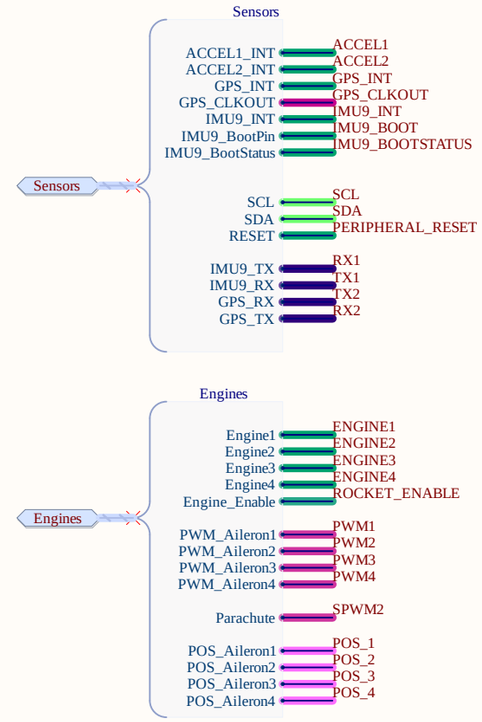
I2C PULL-UPS



EEPROMS



Sheet ports



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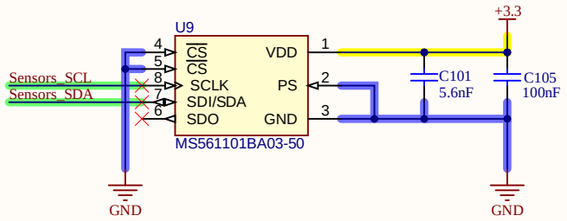
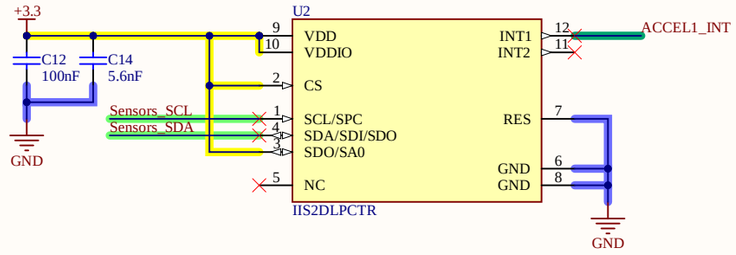
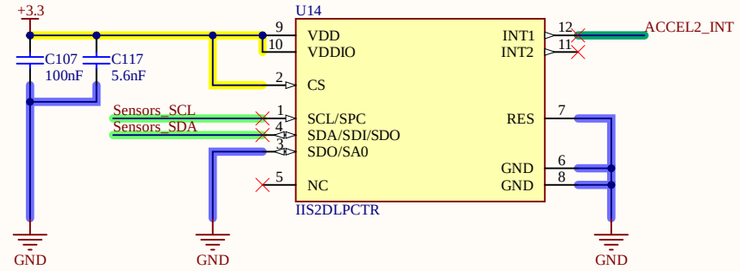
Barometer

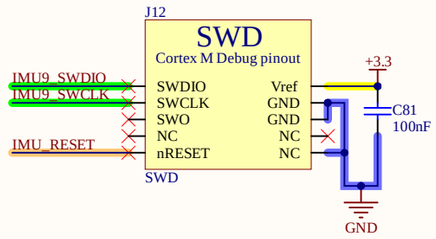


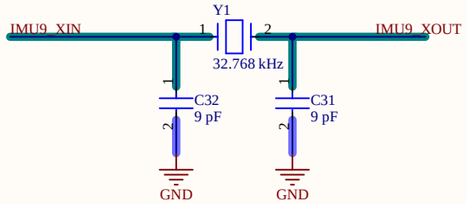
Accelerometer

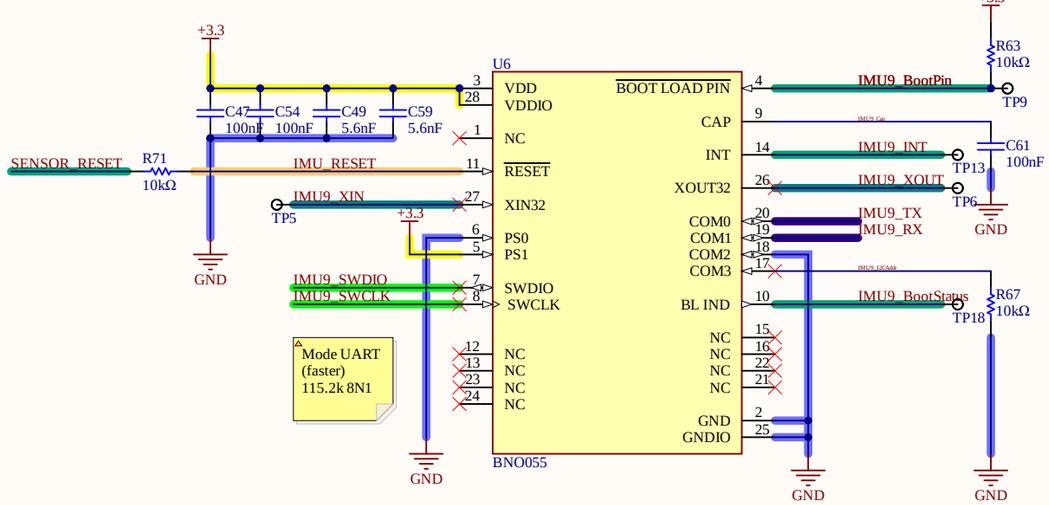




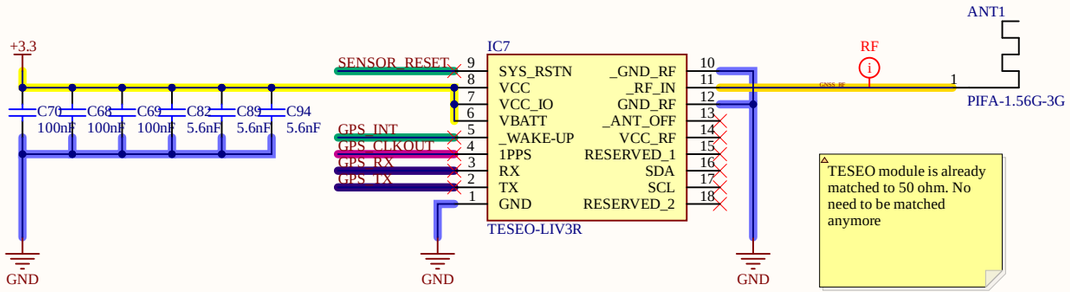
BNO055 9 Axis IMU



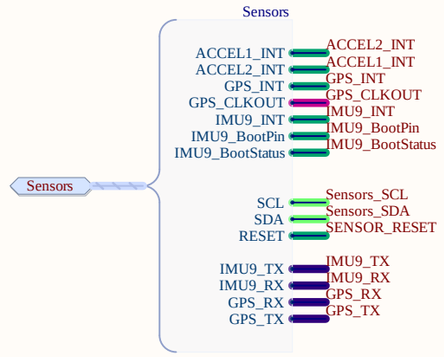




TESEO GPS Module



Sheet ports



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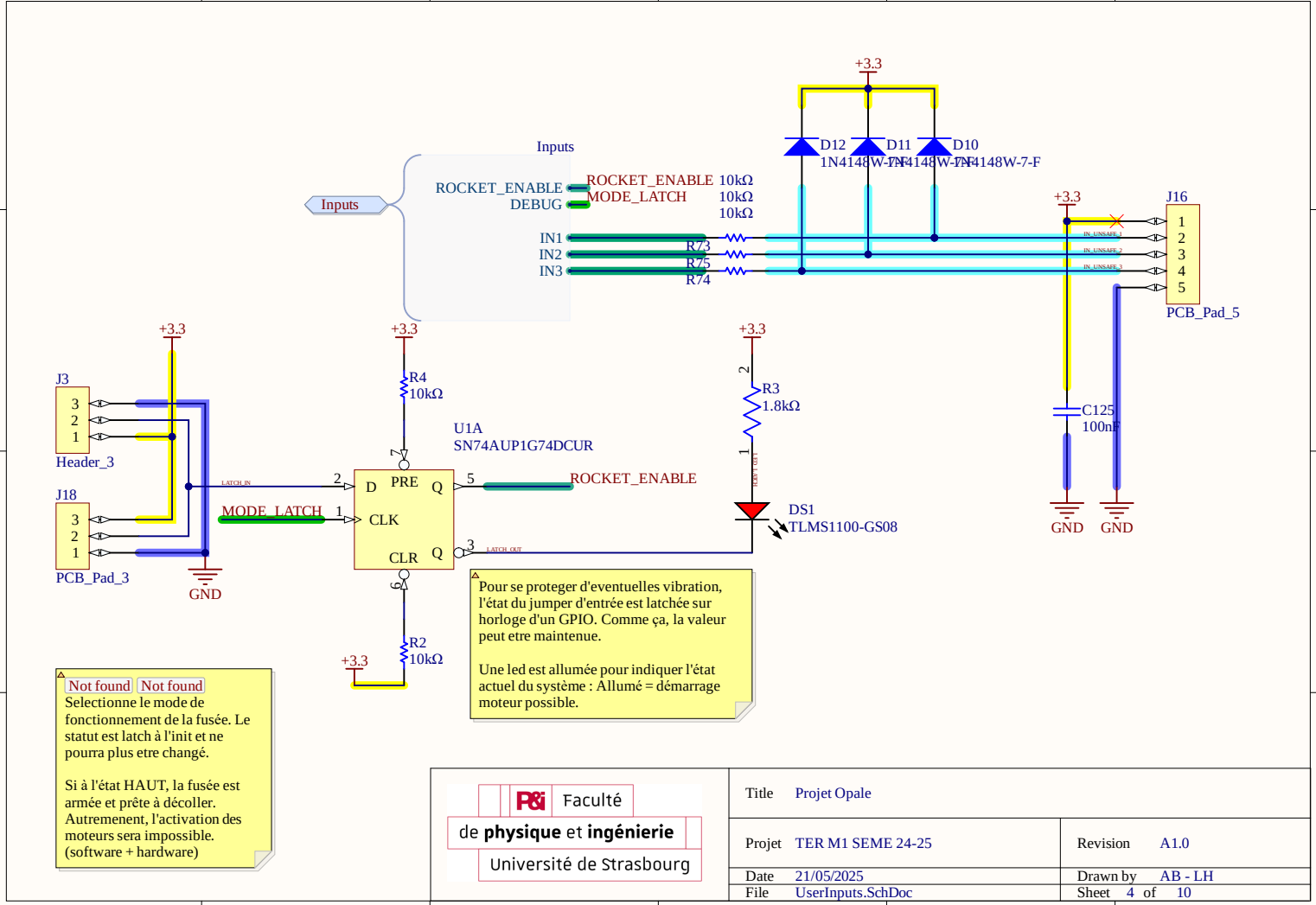

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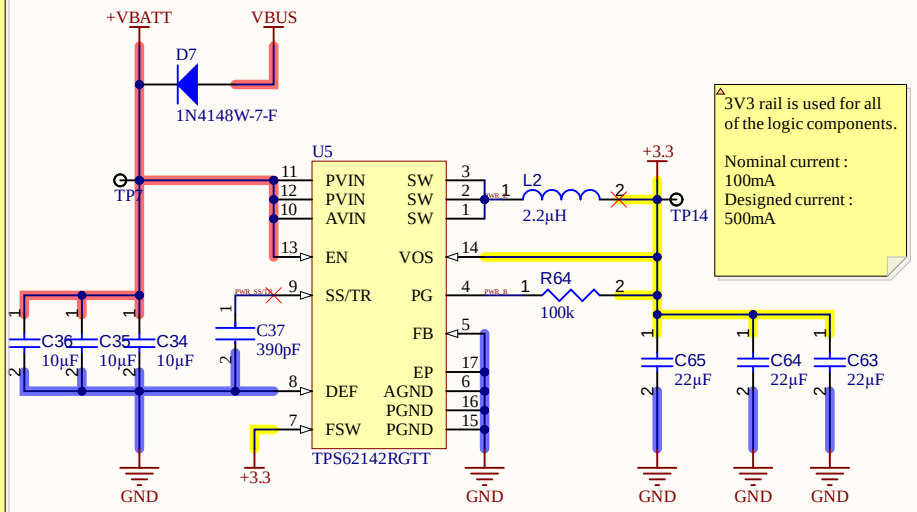
3V3 buck for MCU + Digital logic

D7 is used to let 5V pass to the SMPS for the main 3.3V regulator.

This let us program the MCU and use it's functions without needing a 9V battery.

When VBATT > VBUS : No current flow
When VBUS < VBATT : Current flow.

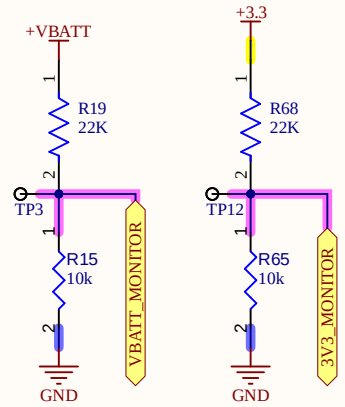
ATTENTION :
VBATT shall be > VBUS or 0V to prevent any excessive current
Do not put a battery in when USB powered, ortherwise during the turn-off delay of the diode, an excessive voltage is going to be applied on the VBUS and probably damaging all of the components.

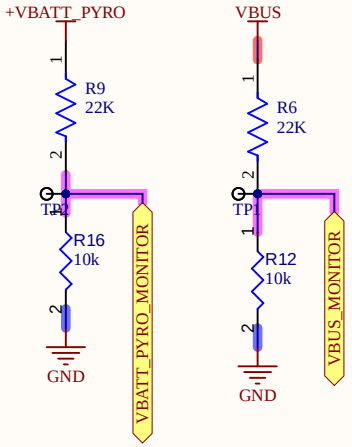


3V3 rail is used for all of the logic components.

Nominal current : 100mA
Designed current : 500mA

Resistor divider for monitoring

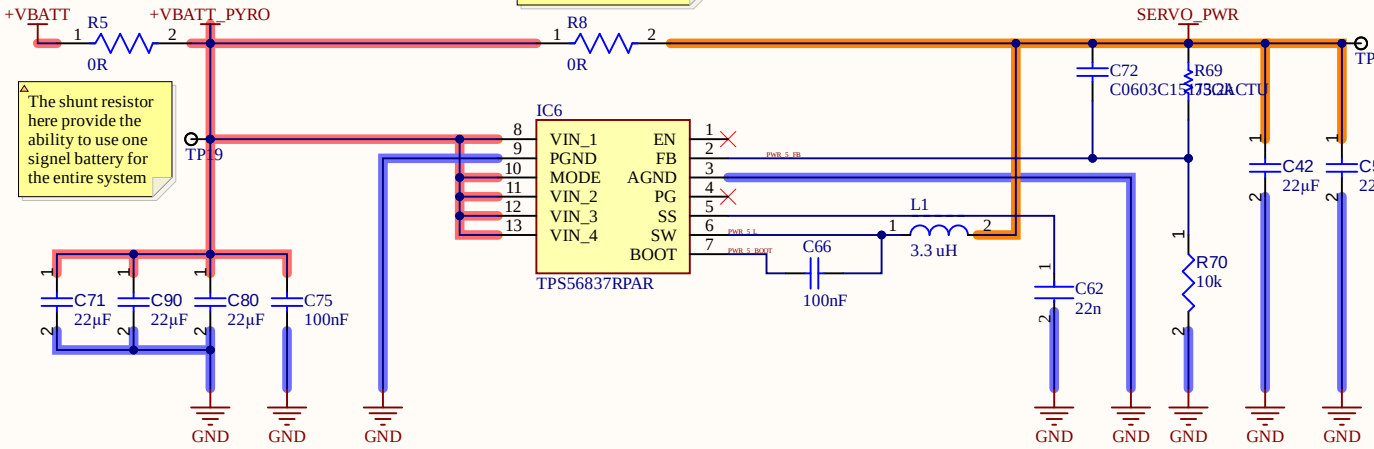




5V buck for servo engines

The shunt resistor here provide the ability to use 9V servo engines, at the cost of disabling the 5V

The shunt resistor here provide the ability to use one signel battery for the entire system



5V Rail is designed for all of the servo motor power.

Nominal current : 800mA
Designed current : 2A

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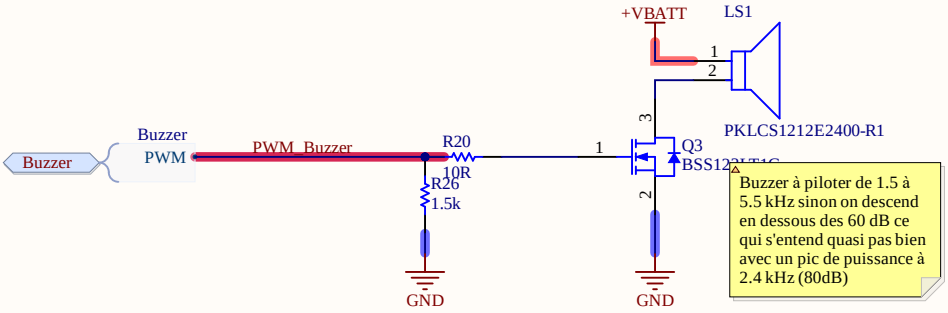

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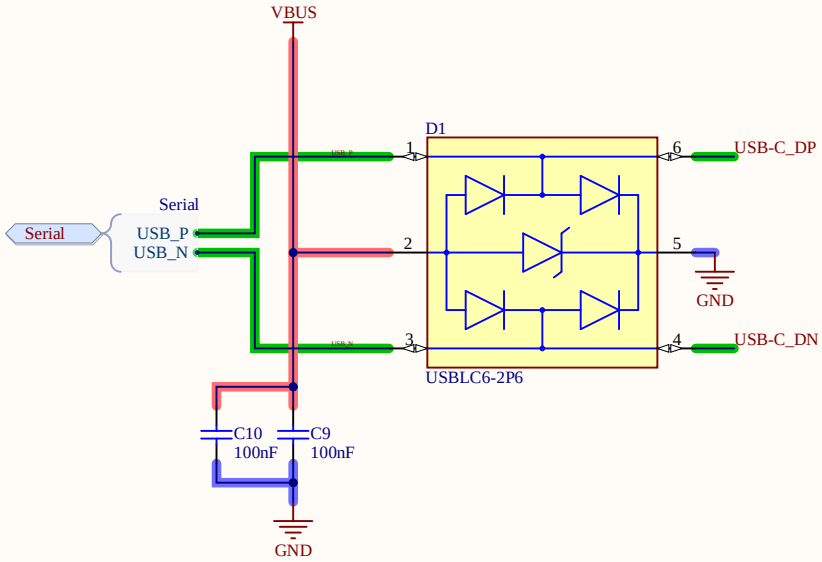

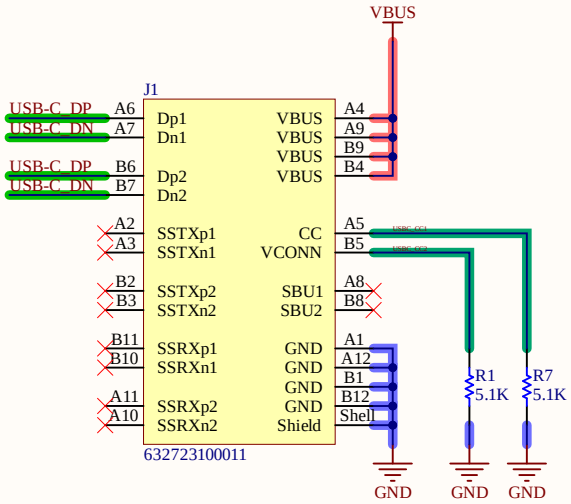

Two 5.1k resistors on CC1 and CC2 since the board require a 5V VBUS to be present for the D+ and D- lines to be driven by the MCU.

This is part of the USB-C specs

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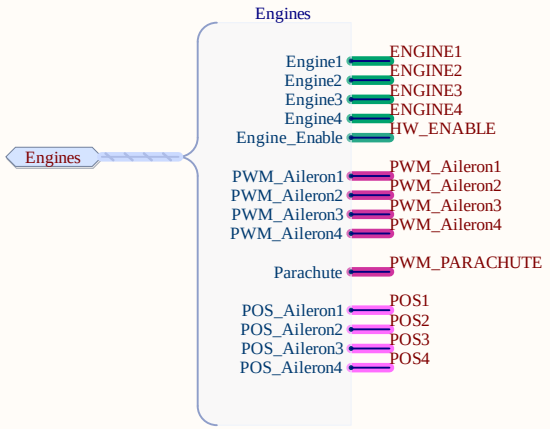
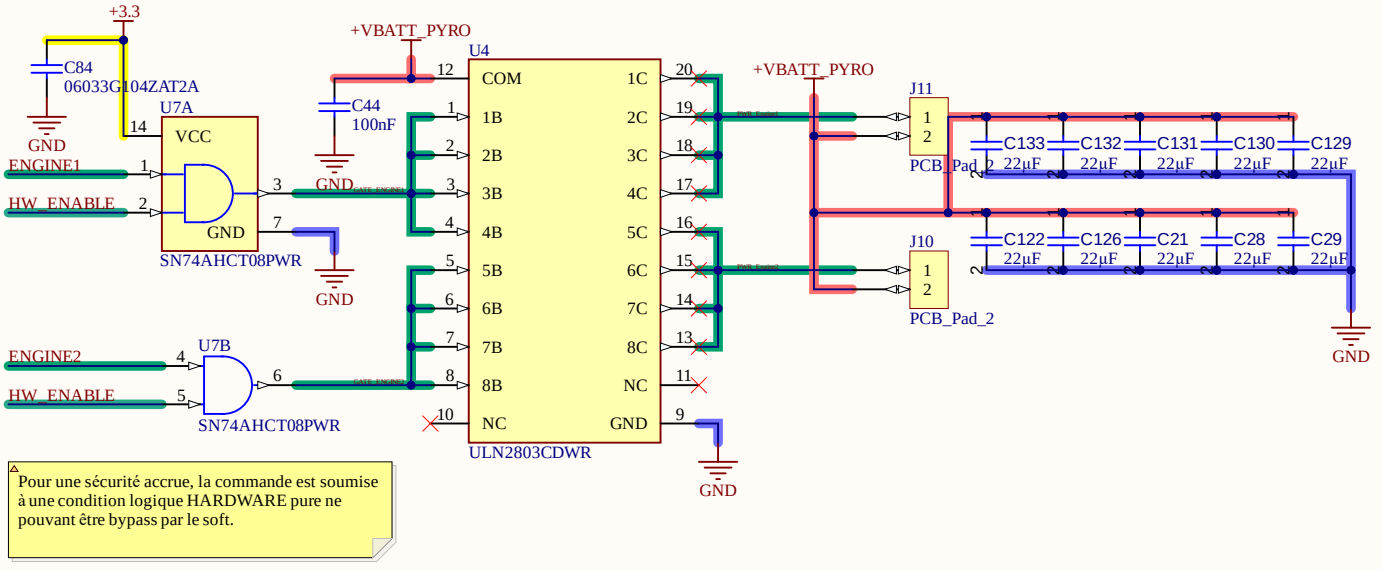
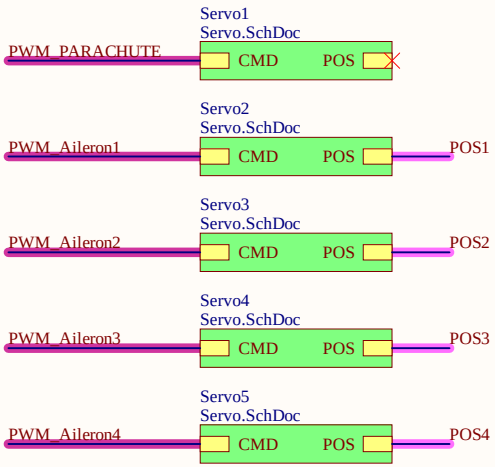
Sheet ports



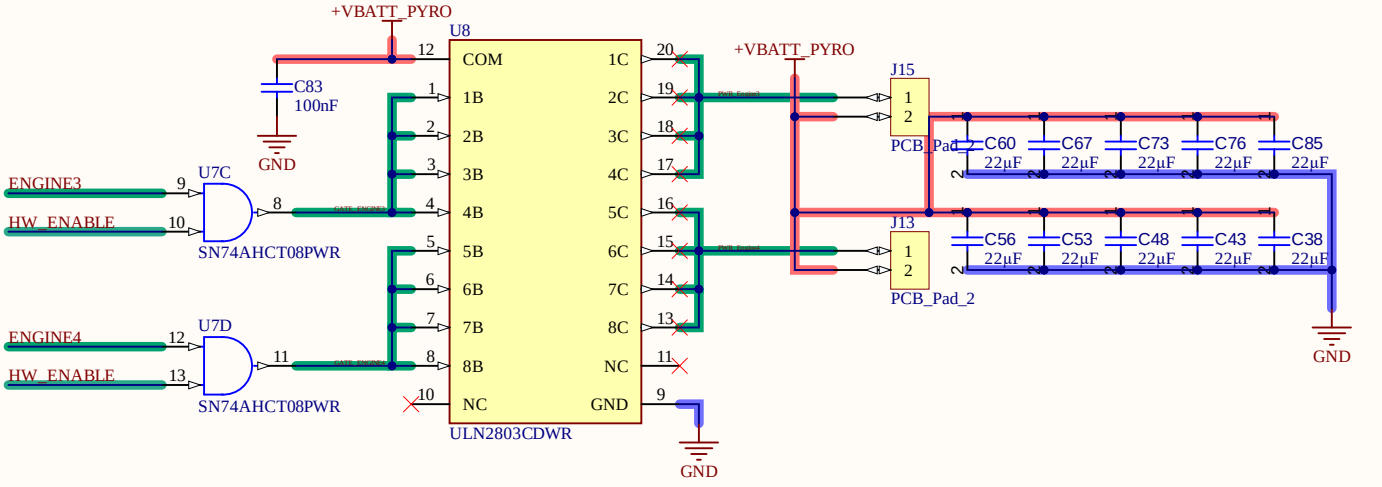
Engine power circuitry for 1&2



Servo engines circuitry



Engine power circuitry for 3&4



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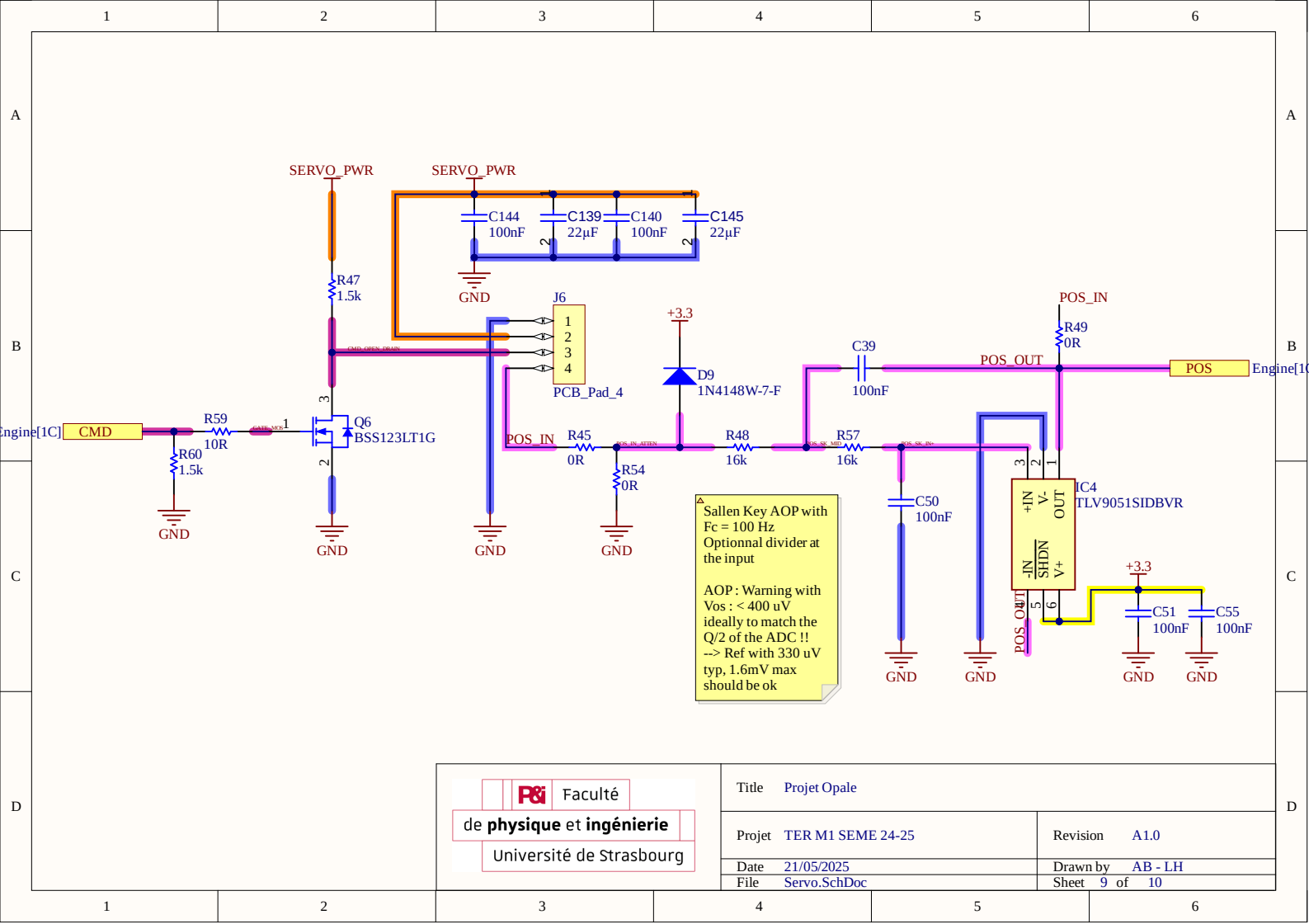
SERVO_PWR
SERVO_PWR
C144
100nF
C139
22µF
C140
100nF
C145
22µF
GND
R47
1.5k
J6
1
2
3
4
PCB_Pad_4
+3.3
D9
1N4148W-7-F
C39
100nF
POS_IN
R49
0R
POS_OUT
POS
Engine[1C]
CMD
R59
10R
R60
1.5k
Q6
BSS123LT1G
POS_IN
R45
0R
R54
0R
R48
16k
R57
16k
C50
100nF
IC4
TLV9051SIDBVR
+IN
V-
OUT
-IN
SHDN
V+
POS_OUT
C51
100nF
C55
100nF
Sallen Key AOP with Fc = 100 Hz Optionnal divider at the input
AOP : Warning with Vos : < 400 uV ideally to match the Q/2 of the ADC !! --> Ref with 330 uV typ, 1.6mV max should be ok
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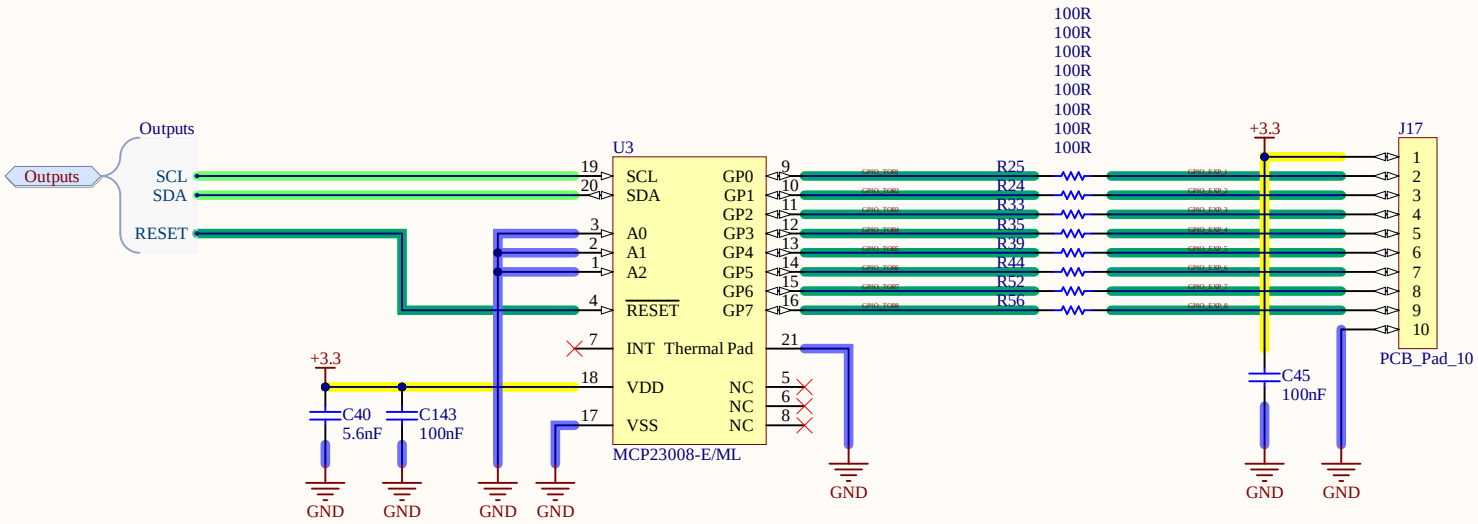

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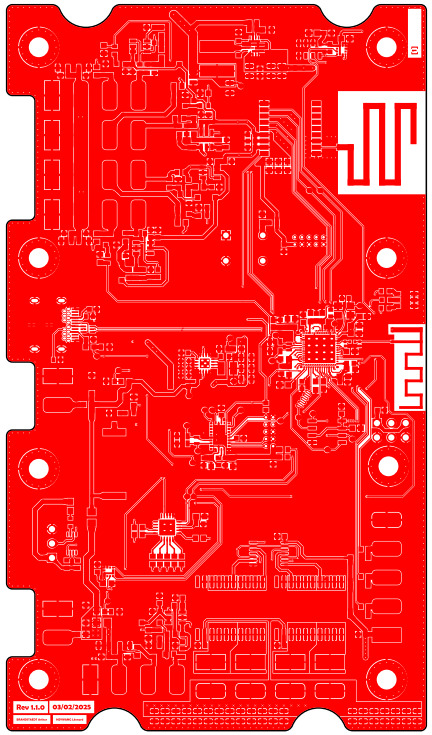
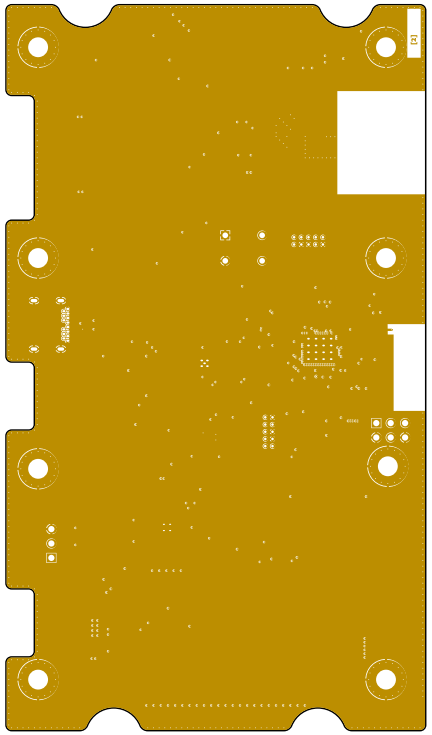
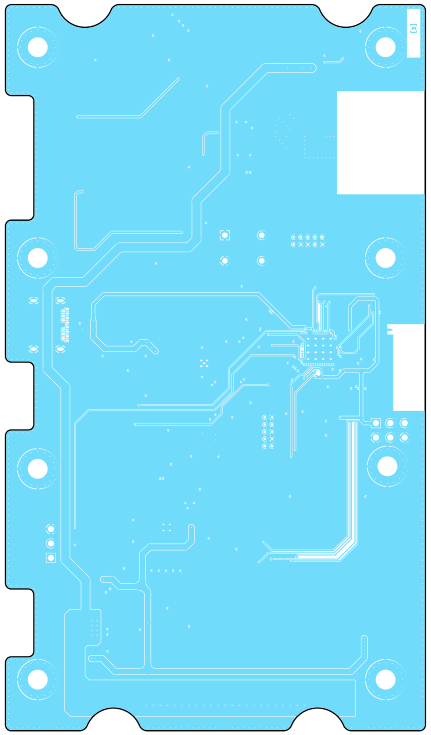


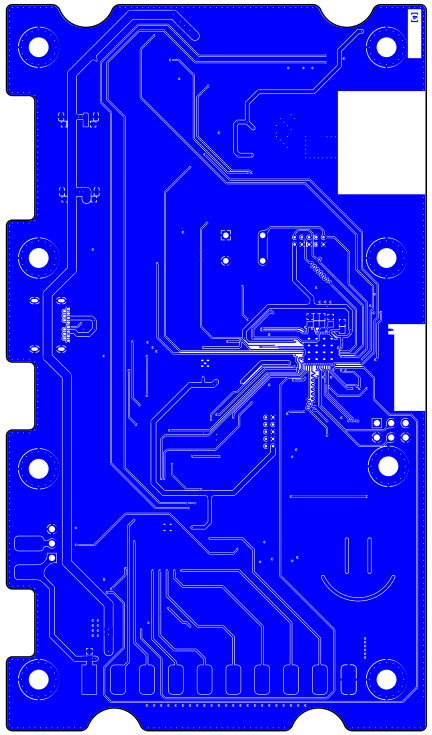
Top (Scale 1:1.33)



GND1 (Scale 1:1.33)

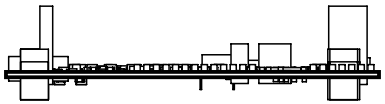


Int (Scale 1:1.33)

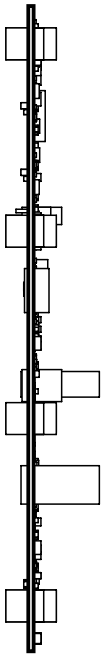


Bot (Scale 1:1.33)

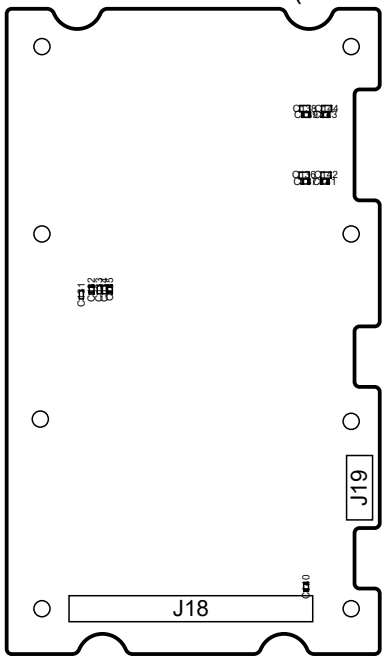
View from Front side (Scale 2:3)



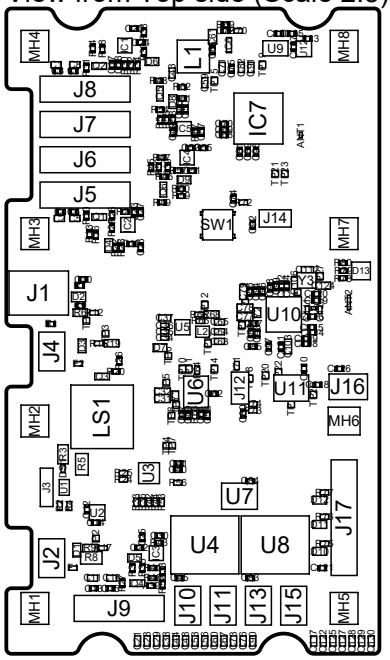
View from Left side (Scale 2:3)



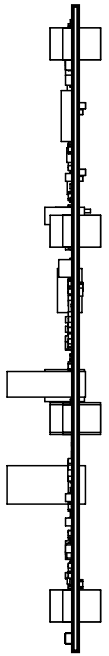
View from Bottom side (Scale 2:3)



View from Top side (Scale 2:3)

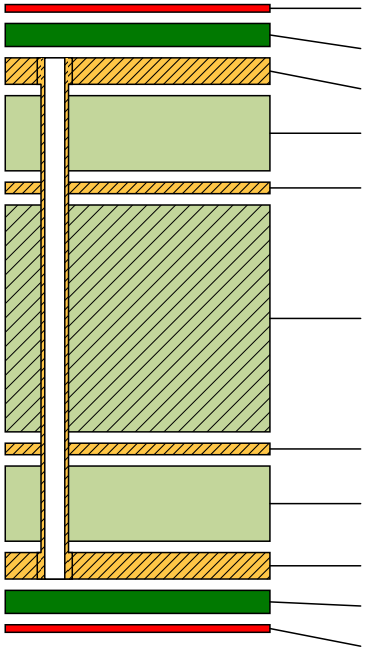


View from Right side (Scale



View from Back side (Scale 2:3)

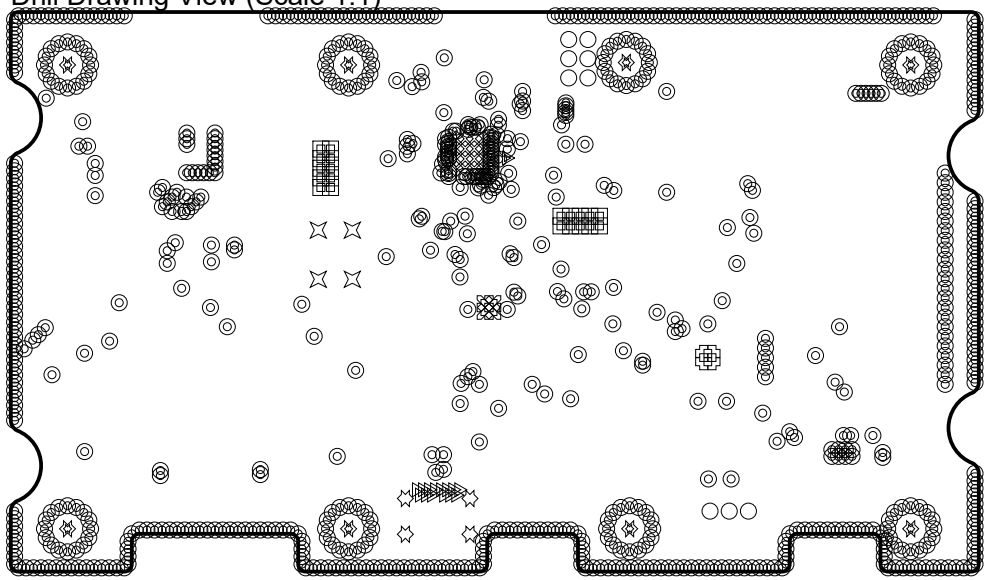
Layer Stack Legend



Material	Layer	Thickness	Dielectric Material	Type	Gerber
	Top Overlay			Legend	GTO
Surface Material	Top Solder	0.03mm	Solder Resist	Solder Mask	GTS
CF-004	**Top**	**0.04mm**		**Signal**	**GTL**
Prepreg		*0.10mm*	*PP-015*	*Dielectric*	
CF-003	**GND1**	**0.02mm**		**Signal**	**G1**
		0.70mm	*FR-4*	*Dielectric*	
CF-003	**Int**	**0.02mm**		**Signal**	**G2**
Prepreg		*0.10mm*	*PP-015*	*Dielectric*	
CF-004	**Bot**	**0.04mm**		**Signal**	**GBL**
Surface Material	Bottom Solder	0.03mm	Solder Resist	Solder Mask	GBS
	Bottom Overlay			Legend	GBO

Total thickness: 1.06mm

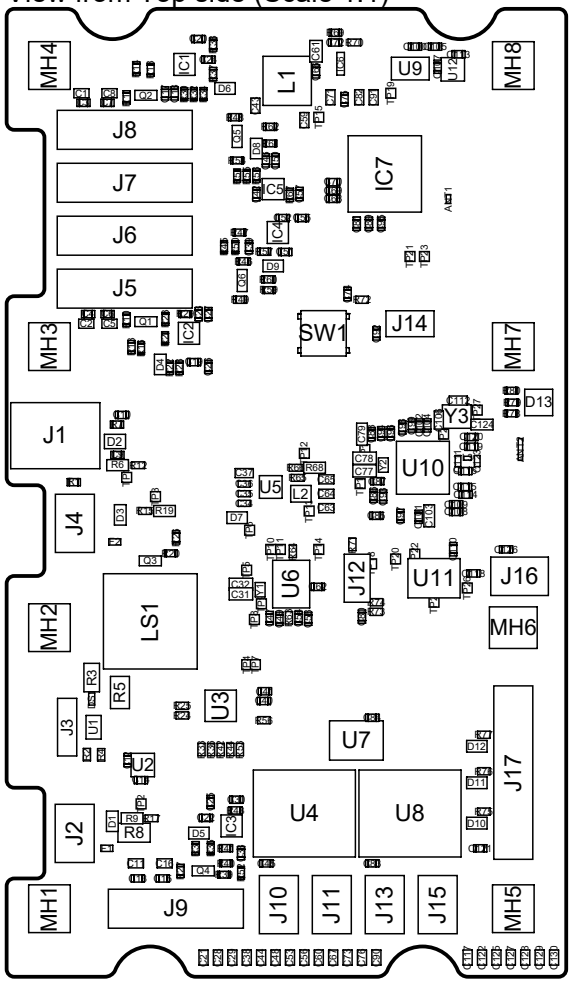
Drill Drawing View (Scale 1:1)



Drill Table

Symbol	Count	Hole Size	Plated	Hole Tolerance
◎	745	0.15mm	Plated	
⌖	4	0.20mm	Plated	
▽	1	0.25mm	Plated	
⊠	5	0.30mm	Plated	
◇	16	0.30mm	Plated	
▽	14	0.40mm	Plated	
⊡	20	0.45mm	Plated	
✡	4	0.60mm	Plated	
⊠	4	1.00mm	Plated	
○	9	1.10mm	Plated	
✡	8	3.50mm	Non-Plated	
	830 Total			

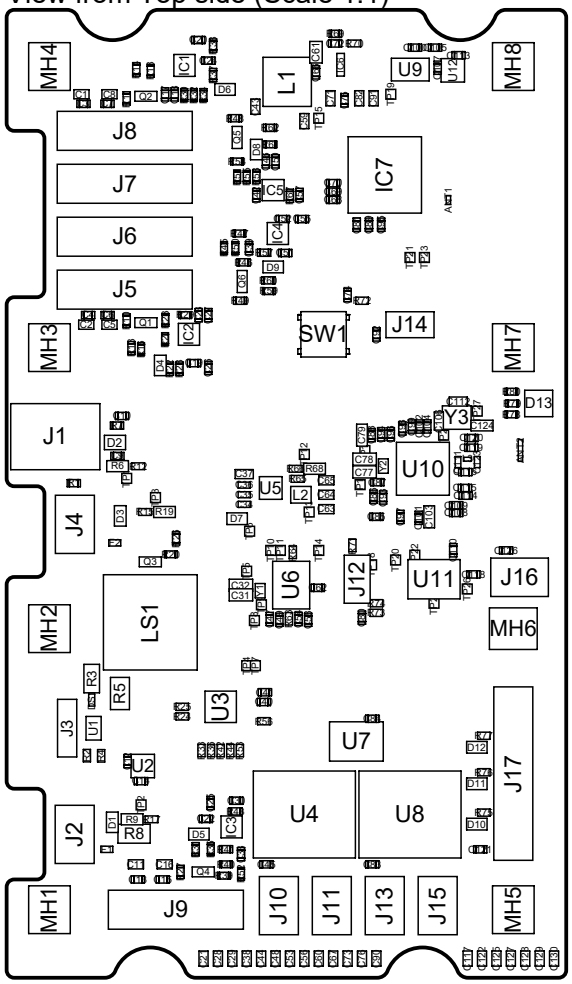
View from Top side (Scale 1:1)



Bill Of Materials

Line #	Designator	Name	Quantity
	C1, C9, C10, C12, C39_Servo1, C39_Servo2, C39_Servo3, C39_Servo4, C39_Servo5, C44, C45, C47, C50_Servo1, C50_Servo2, C50_Servo3, C50_Servo4, C50_Servo5, C51_Servo1, C51_Servo2, C51_Servo3, C51_Servo4, C51_Servo5, C54, C55_Servo1, C55_Servo2, C55_Servo3, C55_Servo4, C55_Servo5, C61, C66, C68, C69, C70, C75, C81, C83, C84, C86, C88, C92, C95, C103, C105, C107, C109, C114, C119, C125, C135, C140_Servo1, C140_Servo2, C140_Servo3, C140_Servo4, C140_Servo5, C143, C144_Servo1, C144_Servo2, C144_Servo3, C144_Servo4, C144_Servo5	100nF, 06033G104ZAT2A	60
	C14, C40, C49, C59, C74, C82, C87, C89, C91, C93, C94, C96, C97, C99, C100, C101, C104, C108, C115, C117, C118, C120, C123, C124	5.6nF	24
	C21, C28, C29, C38, C42, C43, C48, C53, C56, C58, C60, C63, C64, C65, C67, C71, C73, C76, C80, C85, C90, C122, C126, C129, C130, C131, C132, C133, C139_Servo1, C139_Servo2, C139_Servo3, C139_Servo4, C139_Servo5, C145_Servo1, C145_Servo2, C145_Servo3, C145_Servo4, C145_Servo5	Capacitor 22µF +/-40% 16V 0805	38
	C31, C32, C77, C78	9 pF	4
	C34, C35, C36	Capacitor 10µF +/-20% 10V 0603	3
	C37	390pF	1
	C62	22n	1
	C72	C0603C151J5GACTU	1
	C79, C102, C128, C134, C136, C137	1 µF	6
	C98, C138	4.7 uF	2
	C106, C116	10 pF	2
	C121, C127	0.7pF, NC	2
	D1	USBLC6-2P6	1

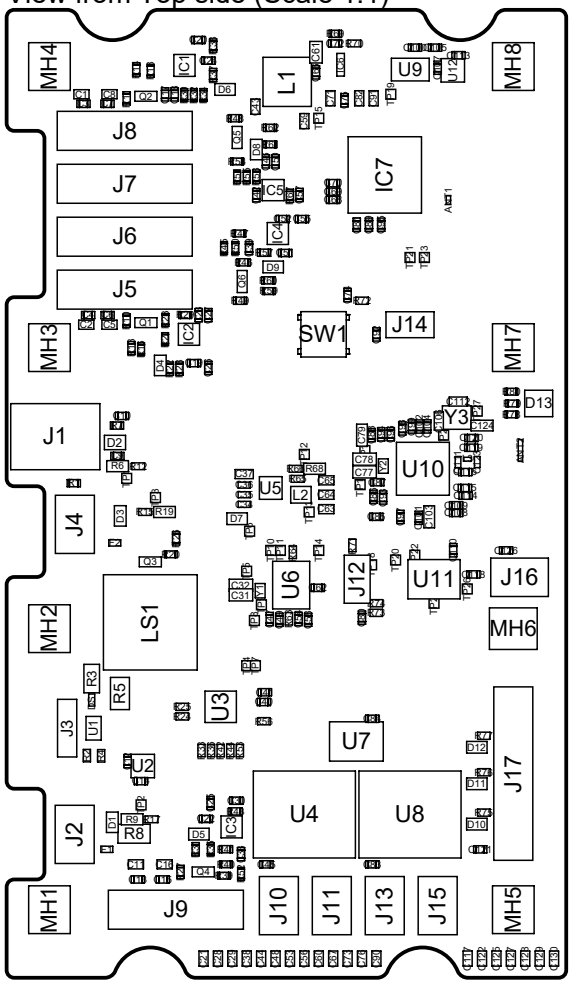
View from Top side (Scale 1:1)



Bill Of Materials

Line #	Designator	Name	Quantity
	D2, D3, D7, D9_Servo1, D9_Servo2, D9_Servo3, D9_Servo4, D9_Servo5, D10, D11, D12	1N4148W-7-F	11
	D13	3535 LEDS	1
	DS1	TLMS1100-GS08	1
	F1, F2	0408001.WR	2
	IC4_Servo1, IC4_Servo2, IC4_Servo3, IC4_Servo4, IC4_Servo5	TLV9051SIDBVR	5
	IC6	TPS56837RPAR	1
	IC7	TESEO-LIV3R	1
	J1	632723100011	1
	J3	Header_3	1
	J5	Header_3x2	1
	J12, J14	SWD	2
	L1	3.3 uH	1
	L2	LQM2HPN2R2MG0L	1
	L3	2.2nH	1
	LS1	PKLCS1212E2400-R1	1
	MH1, MH2, MH3, MH4, MH5, MH6, MH7, MH8	M3 Screw	8
	Q3, Q6_Servo1, Q6_Servo2, Q6_Servo3, Q6_Servo4, Q6_Servo5	BSS123LT1G	6
	R1, R7	5.1K	2
	R2, R4, R10, R11, R63, R67, R71, R72, R73, R74, R75	10kΩ	11
	R3	1.8kΩ	1
	R5, R8	0R	2
	R6, R9, R19, R68	22K	4
	R12, R15, R16, R65, R70	Resistor 10k +/-1% 0603 100 mW	5
	R20, R59_Servo1, R59_Servo2, R59_Servo3, R59_Servo4, R59_Servo5	10R	6
	R24, R25, R33, R35, R39, R44, R52, R56	100R	8
	R26, R47_Servo1, R47_Servo2, R47_Servo3, R47_Servo4, R47_Servo5, R60_Servo1, R60_Servo2, R60_Servo3, R60_Servo4, R60_Servo5	1.5k	11
	R45_Servo1, R45_Servo2, R45_Servo3, R45_Servo4, R45_Servo5, R49_Servo1, R49_Servo2, R49_Servo3, R49_Servo4, R49_Servo5, R54_Servo1, R54_Servo2, R54_Servo3, R54_Servo4, R54_Servo5	0R	15

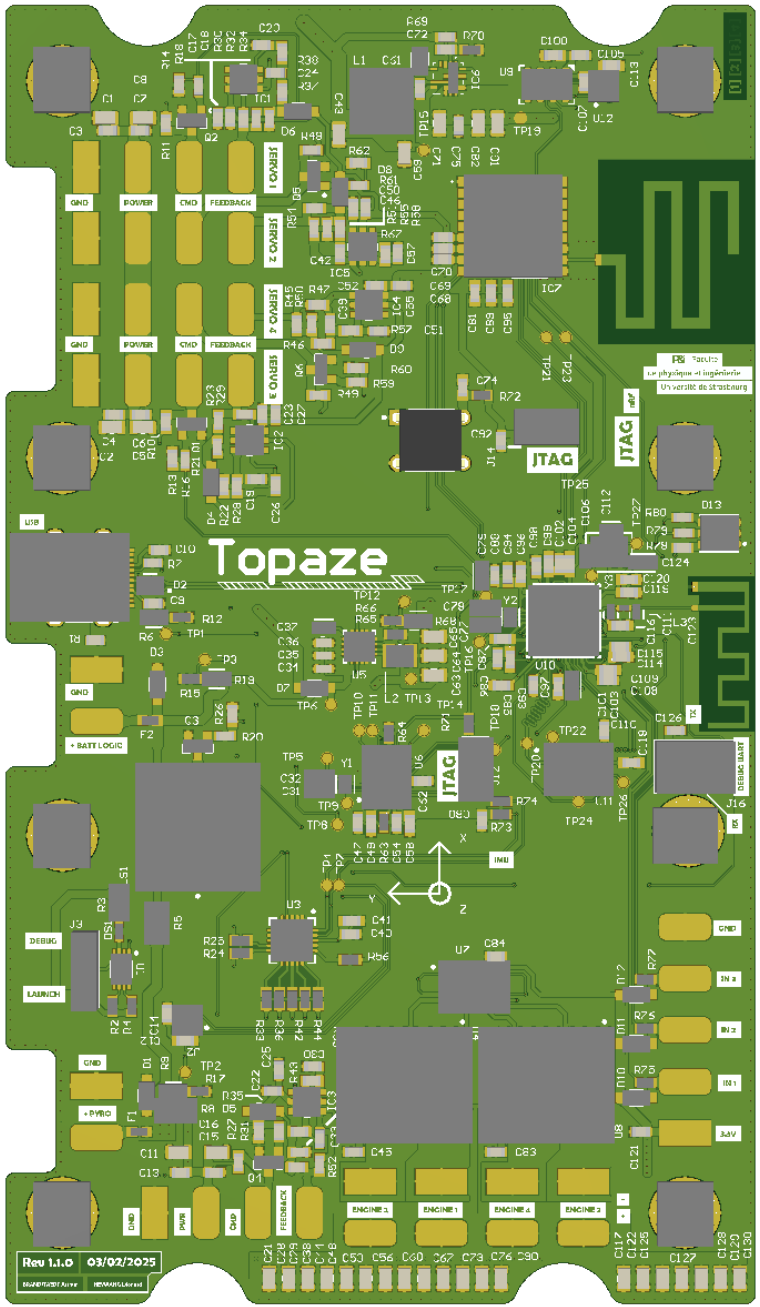
View from Top side (Scale 1:1)

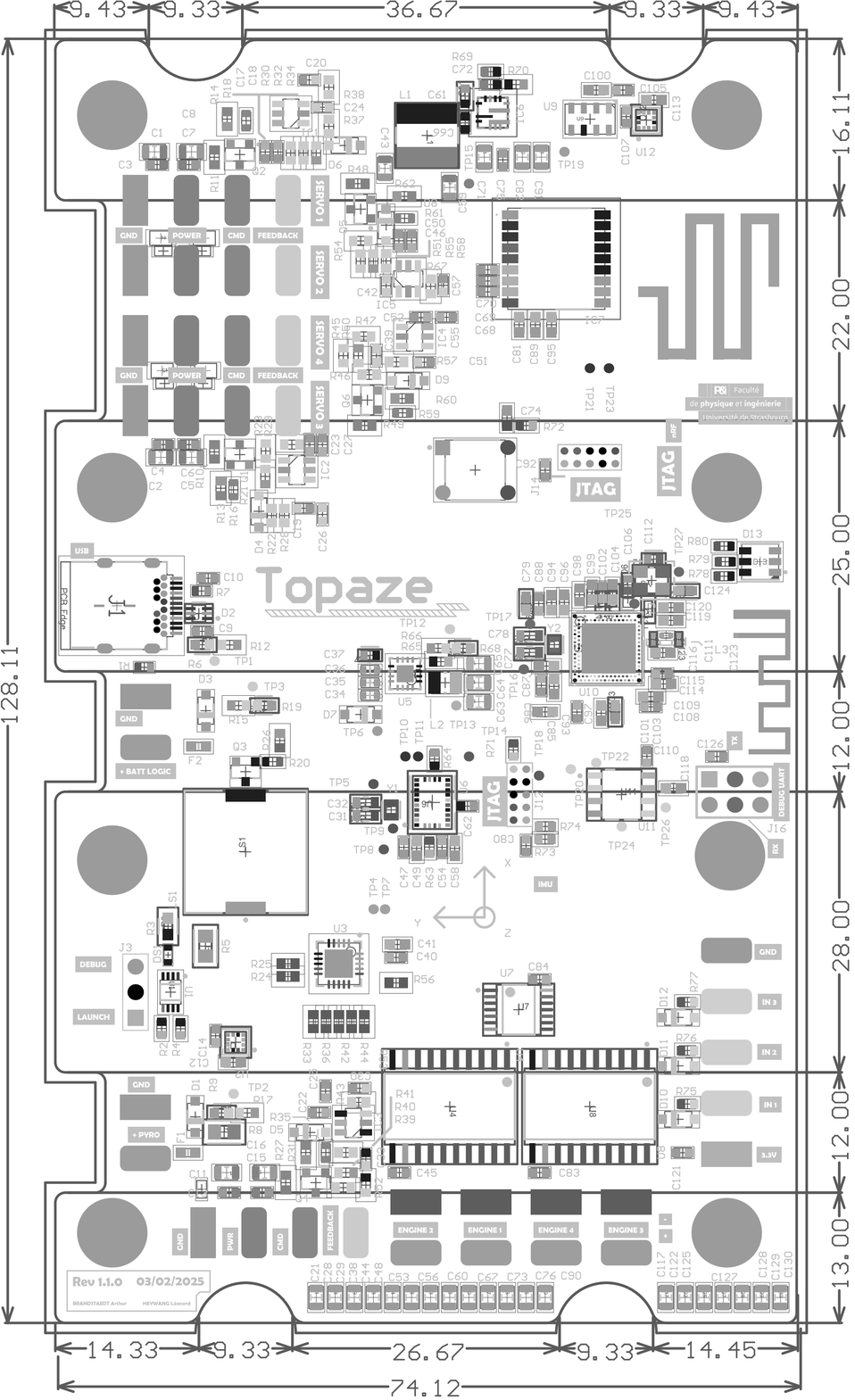


Bill Of Materials

Line #	Designator	Name	Quantity
	R48_Servo1, R48_Servo2, R48_Servo3, R48_Servo4, R48_Servo5, R57_Servo1, R57_Servo2, R57_Servo3, R57_Servo4, R57_Servo5	16k	10
	R64	Resistor 100k +/-1% 0603 100 mW	1
	R69	73.2k	1
	R76, R77, R78	330R	3
	SW1	B3F-1000	1
	U1	SN74AUP1G74DCUR	1
	U2, U14	IIS2DLPCTR	2
	U3	MCP23008-E/ML	1
	U4, U8	ULN2803CDWR	2
	U5	TPS62142RGTT	1
	U6	BNO055	1
	U7	SN74AHCT08PWR	1
	U9	MS561101BA03-50	1
	U10	nRF5340-QKAA	1
	U13	M95P16-EXMNT/E	1
	Y1, Y2	32.768 kHz	2
	Y3	32 MHz	1

Realistic View



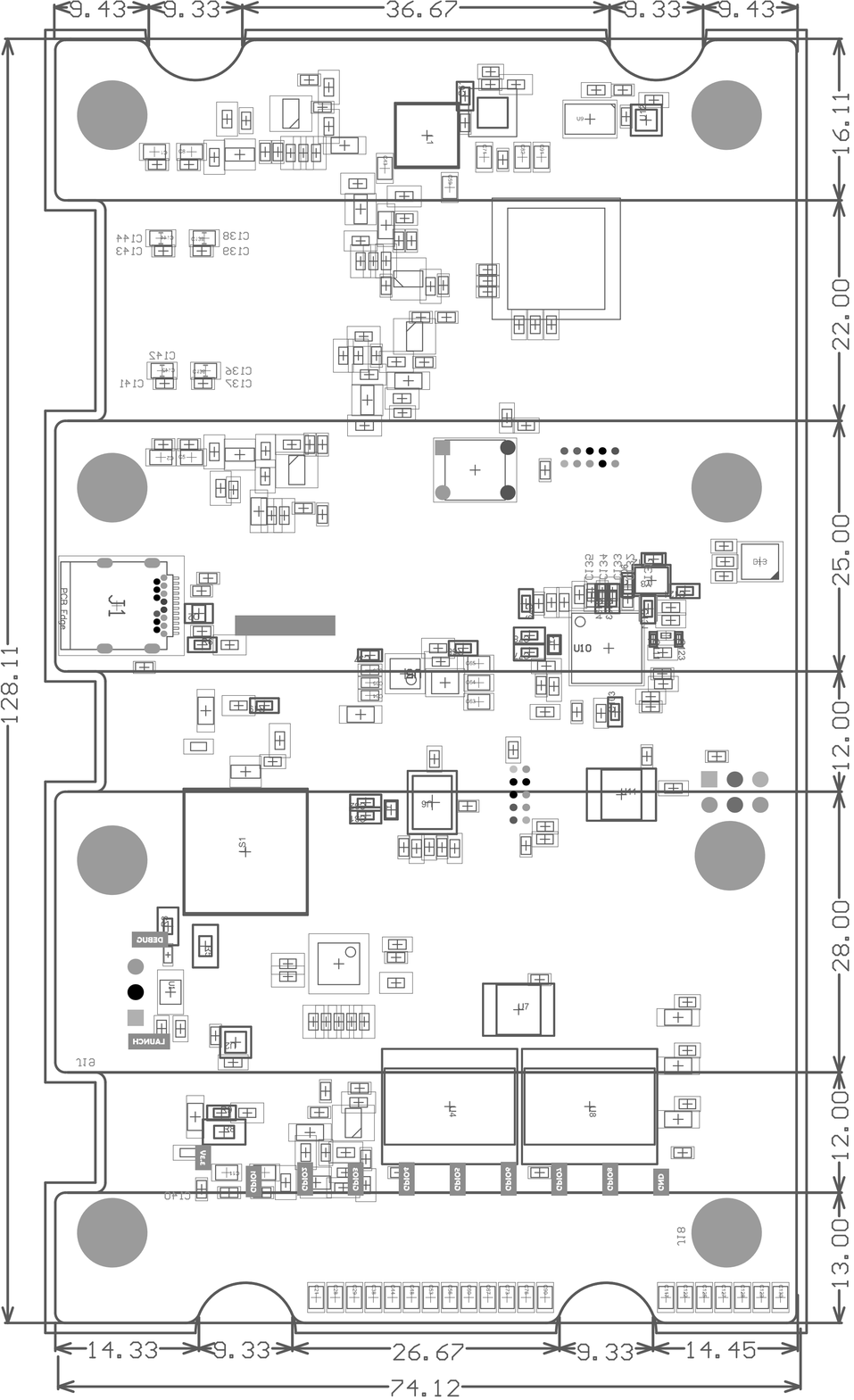


Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	1.20mil	3.8	
1	Top	CF-004	1.38mil		
	Dielectric 2	PP-015	3.91mil	4.1	
2	GND1	CF-003	0.60mil		
	Dielectric 1	FR-4	27.56mil	4.6	
3	Int	CF-003	0.60mil		
	Dielectric 3	PP-015	3.91mil	4.1	
4	Bot	CF-004	1.38mil		
	Bottom Solder	Solder Resist	1.20mil	3.8	
	Bottom Overlay				

This layer configuration correspond to the JLC04101H-3313 stackup with a 1mm thick PCB

Make sure when ordering to check this stackup !!!

To ensure a correct fabrication, make sure to order with via filled with copper paste, for the nRF pads where VIA$ are placed directly under the the pads.



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	Dielectric 1	FR-4	27.56mil	4.6	
3	Int	CF-003	0.60mil		
	Dielectric 3	PP-015	3.91mil	4.1	
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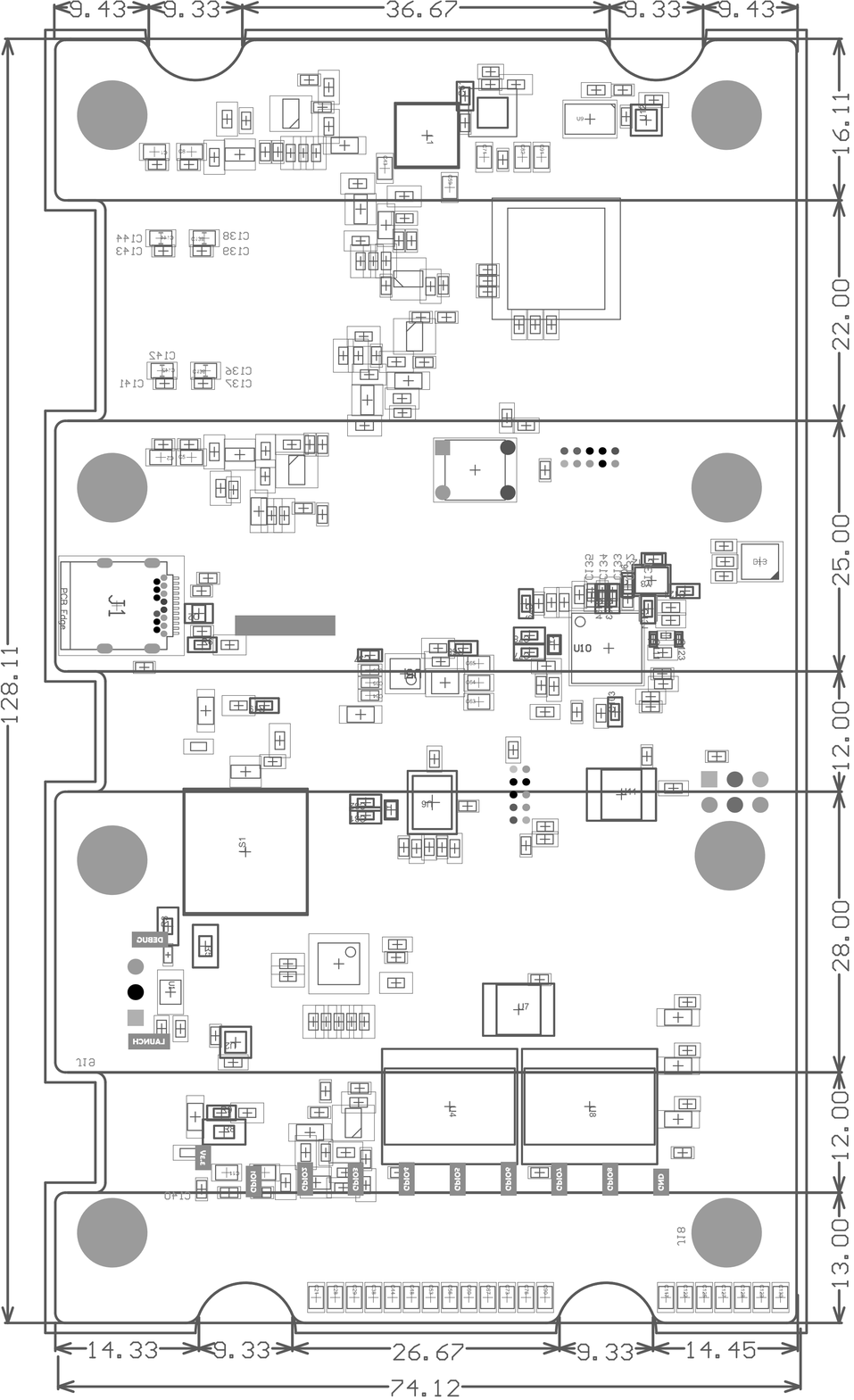

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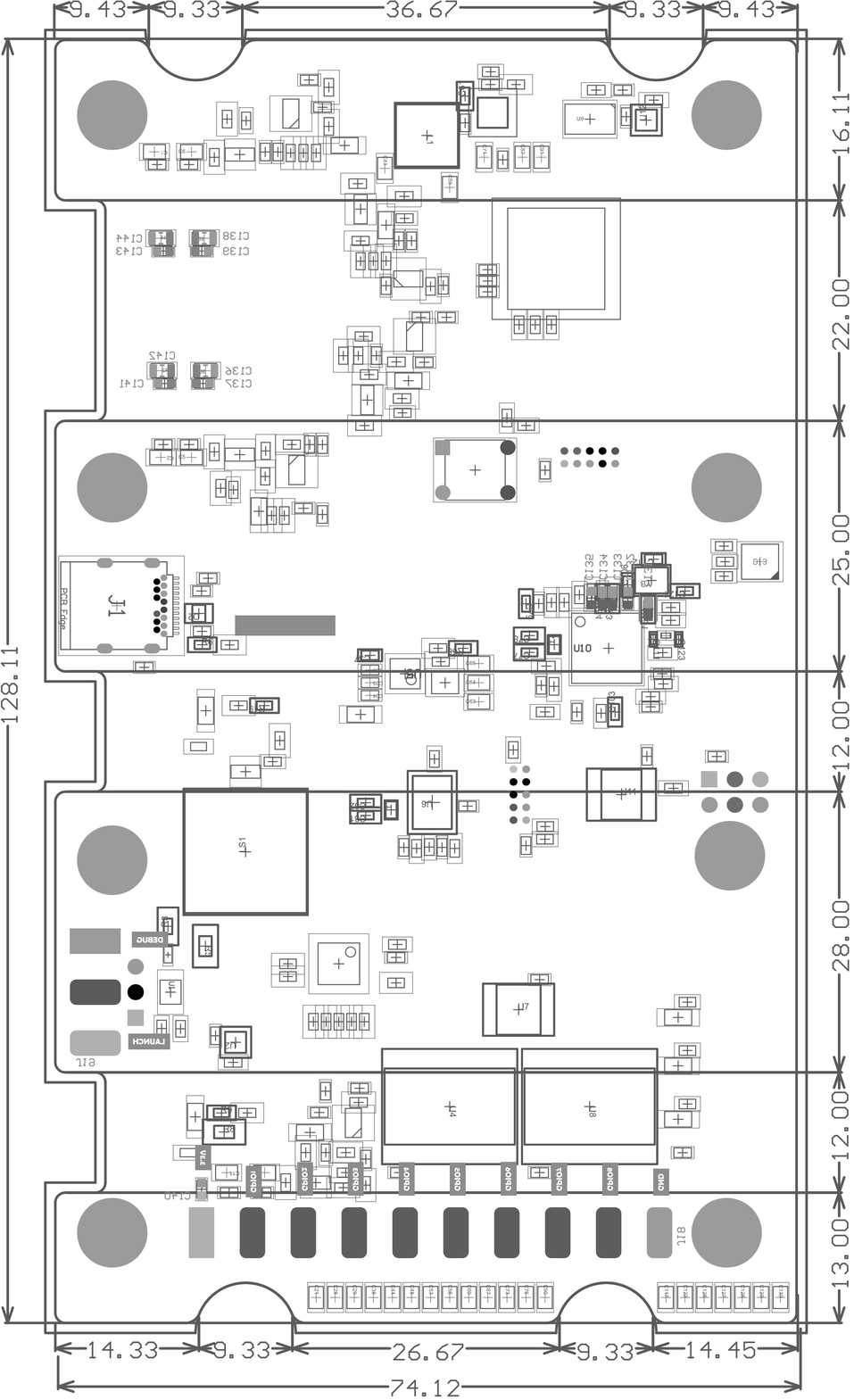

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	Dielectric 1	FR-4	27.56mil	4.6	
3	Int	CF-003	0.60mil		
	Dielectric 3	PP-015	3.91mil	4.1	
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	Bottom Solder	Solder Resist	1.20mil	3.8	
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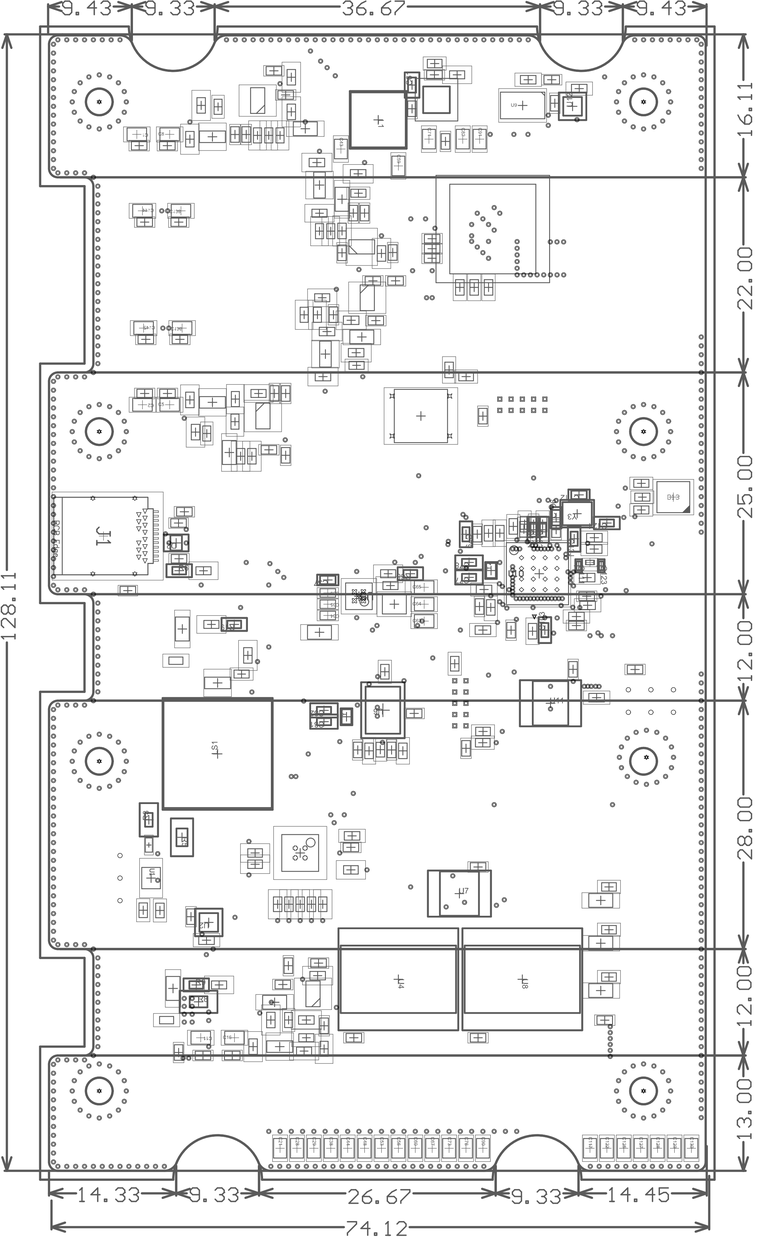

Layer	Name	Material	Thickness	Constant	Board Layer Stack
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	Bottom Solder	Solder Resist	1.20mil	3.8	
	Bottom Overlay				

This layer configuration correspond to the JLC04101H-3313 stackup with a 1mm thick PCB

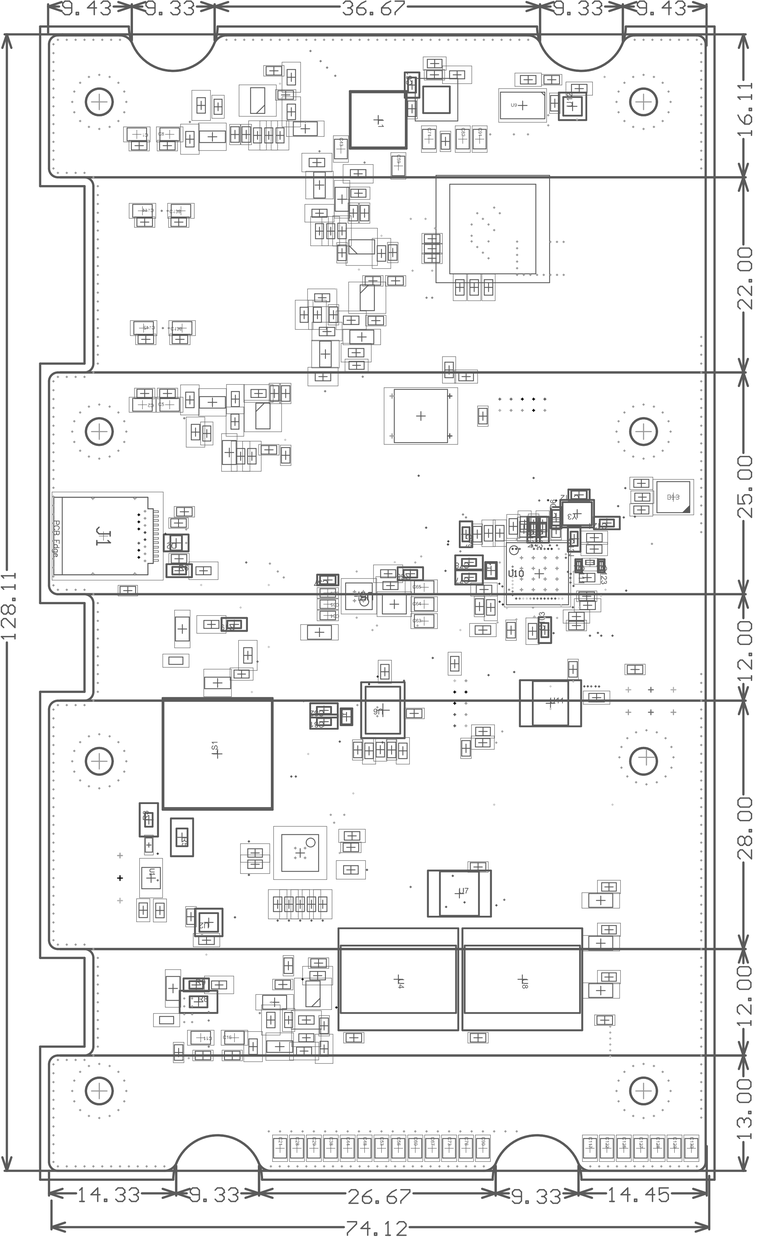
Make sure when ordering to check this stackup !!!

To ensure a correct fabrication, make sure to order with via filled with copper paste, for the nRF pads where VIAS are placed directly under the the pads.

Symbol	Via/Pad	Count	Hole Size	Plated	Hole Type	Pad Shape	Template	Drill Layer Pair
◎	Via	745	0.150mm (5.91mil)	PTH	Round	Rounded	(Mixed)	Top - Bot
⯐	Via	4	0.200mm (7.87mil)	PTH	Round	Rounded	v50h20	Top - Bot
▽	Via	1	0.250mm (9.84mil)	PTH	Round	Rounded	v45h25m0mx0	Top - Bot
⊠	Via	5	0.300mm (11.81mil)	PTH	Round	Rounded	v50h30	Top - Bot
◇	Via	16	0.305mm (12.00mil)	PTH	Round	Rounded	v61h30	Top - Bot
▽	Pad	14	0.400mm (15.75mil)	PTH	Round	Rounded	(Mixed)	Top - Bot
▣	Pad	20	0.450mm (17.72mil)	PTH	Round	Rounded	c75h45	Top - Bot
⯐	Pad	4	0.600mm (23.62mil)	PTH	Slot	Rounded	r100_160h60_120r50	Top - Bot
⊠	Pad	4	1.000mm (39.37mil)	PTH	Round	(Mixed)	(Mixed)	Top - Bot
○	Pad	9	1.100mm (43.31mil)	PTH	Round	(Mixed)	(Mixed)	Top - Bot
✿	Pad	8	3.500mm (137.79mil)	NPTH	Round	Rounded	(Mixed)	Top - Bot
		830 Total						

Epoxy filled vias

Slot definitions : Routed Path Length = Calculated from tool start centre position to tool end centre position.
Hole Length = Routed Path Length + Tool Size = Slot length as defined in the PCB layout



Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	1.20mil	3.8	
1	Top	CF-004	1.38mil		
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	Dielectric 1	FR-4	27.56mil	4.6	
3	Int	CF-003	0.60mil		
	Dielectric 3	PP-015	3.91mil	4.1	
4	Bot	CF-004	1.38mil		
	Bottom Solder	Solder Resist	1.20mil	3.8	
	Bottom Overlay				

This layer configuration correspond to the JLC04101H-3313 stackup with a 1mm thick PCB

Make sure when ordering to check this stackup !!!

To ensure a correct fabrication, make sure to order with via filled with copper paste, for the nRF pads where VIAS are placed directly under the the pads.

Name	Description	Designator	Quantity	Manufacturer 1	Manufacturer Part Number 1	Manufacturer Lifecycle 1	Supplier 1	Supplier Part Number 1	Supplier Unit Price 1	Supplier Subtotal 1
06033G104ZAT2A	Chip Capacitor, 100 nF, 25 V, -30 to 85 degC, 0603 (1608 Metric), RoHS, Tape and Reel	C1, C9, C10, C12, C39_Servo1, C39_Servo2, C39_Servo3, C39_Servo4, C39_Servo5, C44, C45, C47, C50_Servo1, C50_Servo2, C50_Servo3, C50_Servo4, C50_Servo5, C51_Servo1, C51_Servo2, C51_Servo3, C51_Servo4, C51_Servo5, C54, C55_Servo1, C55_Servo2, C55_Servo3, C55_Servo4, C55_Servo5, C61, C66, C68, C69, C70, C75, C81, C83, C84, C86, C88, C92, C95, C103, C105, C107, C109, C114, C119, C125, C135, C140_Servo1, C140_Servo2, C140_Servo3, C140_Servo4, C140_Servo5, C143, C144_Servo1, C144_Servo2, C144_Servo3, C144_Servo4, C144_Servo5	60	Kyocera AVX	06033G104ZAT2A	Volume Production	Mouser	581-06033G104Z	0.0159	0.95383
06031C562KAT2A		C14, C40, C49, C59, C74, C82, C87, C89, C91, C93, C94, C96, C97, C99, C100, C101, C104, C108, C115, C117, C118, C120, C123, C124	24	Kyocera AVX	06031C562KAT2A	Volume Production	Mouser	581-06031C562KAT2A	0.07419	1.78
Capacitor 22µF +/-40% 16V 0805	Chip Capacitor, 22µF +/-40%, 16V, 0805, Thickness 1.45 mm	C21, C28, C29, C38, C42, C43, C48, C53, C56, C58, C60, C63, C64, C65, C67, C71, C73, C76, C80, C85, C90, C122, C126, C129, C130, C131, C132, C133, C139_Servo1, C139_Servo2, C139_Servo3, C139_Servo4, C139_Servo5, C145_Servo1, C145_Servo2, C145_Servo3, C145_Servo4, C145_Servo5	38	Samsung	CL21A226MOQNNNE	Not Recommended for New Design	Mouser	187-CL21A226MOQNNNE	0.13071	4.97
CGA3E2C0G1H090D080AA	Cap Ceramic 9pF 50V C0G 0.5pF Pad SMD 0603 +125°C Automotive T/R	C31, C32, C77, C78	4	TDK	CGA3E2C0G1H090D080AA	Volume Production	Mouser	810-CGA3E2C0G1H090D	0.12365	0.49458
Capacitor 10µF +/-20% 10V 0603	Chip Capacitor, 10µF +/-20%, 10V, 0603, Thickness 1 mm	C34, C35, C36	3	Samsung	CL10A106KP8NNNC	Volume Production	Mouser	187-CL10A106KP8NNNC	0.08832	0.26495
C0603C390J5GACTU	CAP CER 39PF 50V 5% NP0 0603	C37	1	KEMET	C0603C390J5GACTU	Volume Production	Mouser	80-C0603C390J5G	0.08832	0.08832
CC0603KRX7R9BB223	CAP CER 0.022UF 50V X7R 0603	C62	1	Yageo	CC0603KRX7R9BB223	Volume Production				
C0603C151J5GACTU		C72	1	KEMET	C0603C151J5GACTU	Volume Production	Mouser	80-C0603C151J5G	0.08832	0.08832
C1608X5R1H105K080AB	Multilayer Ceramic Capacitors 1µF ±10% 50V X5R SMD 0603	C79, C102, C128, C134, C136, C137	6	TDK	C1608X5R1H105K080AB	Volume Production	Mouser	810-C1608X5R1H105K	0.08037	0.80369
C0603C475K8PACTU		C98, C138	2	KEMET	C0603C475K8PACTU	Volume Production	Mouser	80-C0603C475K8P7867	0.1943	0.3886
C0603C100C5GACTU	CAP CER 10PF 50V NP0 0603	C106, C116	2	KEMET	C0603C100C5GACTU	Volume Production	Mouser	80-C0603C100C5G	0.28262	0.56523
GJM1555C1HR70WB01D	Multi-Layer Ceramic Capacitor 0.7pF C0G ±0.05pF 0402 Paper T/R	C121, C127	2	Murata	GJM1555C1HR70WB01D	Volume Production	Mouser	81-GJM1555C1HR70WB1D	0.12365	0.24729
USBLC6-2P6	TVS DIODE 5.25V 17V SOT666	D1	1	STMicroelectronics	USBLC6-2P6	Volume Production	Mouser	511-USBLC6-2P6	0.3886	0.3886
1N4148W-7-F	Fast Switching Diode, 100 V, 0.15 A, -65 to 150 degC, 2-Pin?SOD123, RoHS, Tape and Reel	D2, D3, D7, D9_Servo1, D9_Servo2, D9_Servo3, D9_Servo4, D9_Servo5, D10, D11, D12	11	Diodes	1N4148W-7-F	Volume Production	Mouser	621-1N4148W-F	0.03268	0.35945
150353M153300	150353M153300 WL-SFTD SMT Full-color Top LED Diffused	D13	1	Wurth Electronics	150353M153300	Volume Production	Mouser	710-150353M153300	0.46808	0.46808
TLMS1100-GS08	LED, RED, 2.1 V, -40 to 100 degC, 2-Pin SMD (0603), RoHS, Tape and Reel	DS1	1	Wurth Electronics	150060RS75000	Volume Production	Mouser	710-150060RS75000	0.13248	0.13248
0408001.WR	Fuse	F1, F2	2	Littelfuse	0408001.WR	Unknown	Mouser	576-0408001.WR	1.32	2.63
TLV9051SIDBVR	Integrated Circuit	IC4_Servo1, IC4_Servo2, IC4_Servo3, IC4_Servo4, IC4_Servo5	5	Texas Instruments	TLV9051SIDBVR	Volume Production	Mouser	595-TLV9051SIDBVR	0.48575	2.43
TPS56837RPAR	Integrated Circuit	IC6	1	Texas Instruments	TPS56837RPAR	Unknown	Mouser	595-TPS56837RPAR	2.15	2.15
TESEO-LIV3R		IC7	1	STMicroelectronics	TESEO-LIV3R	Volume Production	Mouser	511-TESEO-LIV3R	9.71	9.71
632723100011		J1	1	Wurth Electronics	632723100011	Volume Production	Mouser	710-632723100011	3.02	3.02
Header_3		J3	1	--	--	Manual Solution				
Header_3x2		J5	1	--	--	Manual Solution				
SWD		J12, J14	2	Samtec	FTSH-105-01-F-D-K	Volume Production	Mouser	200-FTSH10501FDK	1.88	3.76
SRN6045-3R3Y	FIXED IND 3.3UH 3.2A 30.2MOHM SM	L1	1	Bourns	SRN6045-3R3Y	Volume Production	Mouser	652-SRN6045-3R3Y	0.44159	0.44159
LQM2HPN2R2MG0L	Chip Inductor, 2.2 uH, +/- 20%, -55 to 125 degC, 1008 (2520 Metric), RoHS, Tape and Reel	L2	1	Murata	LQM2HPN2R2MG0L	Volume Production	Mouser	81-LQM2HPN2R2MG0L	0.15014	0.15014
744901022	744901022 Fixed Ind 2.2NH 440MA 300MOHM Sm	L3	1	Wurth Electronics	744901022	Volume Production	Mouser	710-744901022	0.3886	0.3886
PKLCS1212E2400-R1	AUDIO PIEZO TRANSDUCER 12.5V SMD	LS1	1	Murata	PKLCS1212E2400-R1	Volume Production	Mouser	81-PKLCS1212E2400-R1	2.21	2.21
M3 Screw		MH1, MH2, MH3, MH4, MH5, MH6, MH7, MH8	8	_	_	Manual Solution				
BSS123LT1G	Power MOSFET, 170 mA, 100 V, N-Channel, 3-Pin SOT-23, Pb-Free, Tape and Reel	Q3, Q6_Servo1, Q6_Servo2, Q6_Servo3, Q6_Servo4, Q6_Servo5	6	ON Semiconductor / Fairchild	BSS123LT1G	Volume Production				
ERJ-3GEYJ512V		R1, R7	2	Panasonic	ERJ-3GEYJ512V	Volume Production	Mouser	667-ERJ-3GEYJ512V	0.08832	0.17664
CRCW060310K0FKEA	Chip Resistor, 10 KOhm, +/- 1%, 100 mW, -55 to 155 degC, 0603 (1608 Metric), RoHS, Tape and Reel	R2, R4, R10, R11, R63, R67, R71, R72, R73, R74, R75	11	Vishay	CRCW060310K0FKEA	Volume Production	Mouser	71-CRCW0603-10K-E3	0.02738	0.30116
CRCW06031K80FKEA	RES Thick Film, 1.8kΩ, 1%, 0.1W, 100ppm/°C, 0603	R3	1	Vishay	CRCW06031K80FKEA	Volume Production	Mouser	71-CRCW0603-1.8K-E3	0.08832	0.08832
CRCW08050000Z0EAHP	RES Thick Film, 0Ω, 0.5W, 0805	R5, R8	2	Vishay Dale	CRCW08050000Z0EAHP	Volume Production	Mouser	71-CRCW08050000Z0EAH	0.10598	0.21196
CRCW060322K0FKEA	RES Thick Film, 22kΩ, 1%, 0.1W, 100ppm/°C, 0603	R6, R9, R19, R68	4	Vishay	CRCW060322K0FKEA	Volume Production	Mouser	71-CRCW0603-22K-E3	0.02738	0.27379
Resistor 10k +/-1% 0603 100 mW	Chip Resistor, 10 KOhm, +/- 1%, 01 W, -55 to 155 degC, 0603 (1608 Metric)	R12, R15, R16, R65, R70	5	Yageo	RC0603FR-0710KL	Volume Production	Mouser	603-RC0603FR-0710KL	0.00795	0.07949
RC0603FR-0710RL	Chip Resistor, 10 Ohm, +/- 1%, 0.1 W, -55 to 155 degC, 0603 (1608 Metric), RoHS, Tape and Reel	R20, R59_Servo1, R59_Servo2, R59_Servo3, R59_Servo4, R59_Servo5	6	Yageo	RC0603FR-0710RL	Volume Production	Mouser	603-RC0603FR-0710RL	0.0159	0.15897
CRCW0603100RFKEA	Chip Resistor, 100 Ohm, +/- 1%, 100 mW,-55 to 155 degC, 0603 (1608 Metric), RoHS, Tape and Ree	R24, R25, R33, R35, R39, R44, R52, R56	8	Vishay Dale	CRCW0603100RFKEA	Volume Production	Mouser	71-CRCW0603-100-E3	0.02031	0.20313
ERJ-3EKF1501V		R26, R47_Servo1, R47_Servo2, R47_Servo3, R47_Servo4, R47_Servo5, R60_Servo1, R60_Servo2, R60_Servo3, R60_Servo4, R60_Servo5	11	Yageo	RC0603FR-071K5L	Volume Production	Mouser	603-RC0603FR-071K5L	0.00883	0.09715
RC0603JR-070RL	Chip Resistor, 0 Ohm, +/- 5%, 0.1 W, -55 to 155 degC, 0603 (1608 Metric), RoHS, Tape and Reel	R45_Servo1, R45_Servo2, R45_Servo3, R45_Servo4, R45_Servo5, R49_Servo1, R49_Servo2, R49_Servo3, R49_Servo4, R49_Servo5, R54_Servo1, R54_Servo2, R54_Servo3, R54_Servo4, R54_Servo5	15	Yageo	RC0603JR-070RL	Volume Production	Mouser	603-RC0603JR-070RL	0.00618	0.09273
ERJ-3EKF1602V		R48_Servo1, R48_Servo2, R48_Servo3, R48_Servo4, R48_Servo5, R57_Servo1, R57_Servo2, R57_Servo3, R57_Servo4, R57_Servo5	10	Panasonic	ERJ-3EKF1602V	Volume Production	Mouser	667-ERJ-3EKF1602V	0.03003	0.30028
Resistor 100k +/-1% 0603 100 mW	Chip Resistor, 100 KOhm, +/- 1%, 0.1 W, -55 to 155 degC, 0603 (1608 Metric)	R64	1	Yageo	RC0603FR-07100KL	Volume Production	Mouser	603-RC0603FR-07100KL	0.08832	0.08832
CRCW060373K2FKEA		R69	1	Vishay	CRCW060373K2FKEA	Volume Production	Mouser	71-CRCW0603-73.2K-E3	0.08832	0.08832
RC0603FR-07330RL	Chip Resistor, 330 Ohm, +/- 1%, 0.1 W, -55 to 155 degC, 0603 (1608 Metric), RoHS, Tape and Reel	R76, R77, R78	3	Yageo	RC0603FR-07330RL	Volume Production	Mouser	603-RC0603FR-07330RL	0.00795	0.07949
B3F-1000	Tactile Switch, SPST-NO, 0.05 A, 24 V, -25 to 70 degC, 4-Pin THD, RoHS, Bulk	SW1	1	Omron	B3F-1000	Volume Production	Mouser	653-B3F-1000	0.22079	0.22079
SN74AUP1G74DCUR	Low-Power Single Positive-Edge-Triggered D-Type Flip-Flop, DCU0008A, LARGE T&R	U1	1	Texas Instruments	SN74AUP1G74DCUR	Volume Production	Mouser	595-SN74AUP1G74DCUR	0.3886	0.3886
IIS2DLPCTR	ACCEL 2-16G I2C/SPI 12LGA	U2, U14	2	STMicroelectronics	IIS2DLPCTR	Volume Production	Mouser	511-IIS2DLPCTR	2.41	4.82
MCP23008-E/ML	8-Bit I/O Expander with Serial Interface, 20-Pin QFN, Extended Temperature	U3	1	Microchip	MCP23008-E/ML	Volume Production	Mouser	579-MCP23008-E/ML	1.32	1.32
ULN2803CDWR	50-V, EIGHT-CHANNEL DARLINGTON A	U4, U8	2	Texas Instruments	ULN2803CDWR	Unknown	Mouser	595-ULN2803CDWR	0.96267	1.93
TPS62142RGTT	Buck Step Down Regulator with 3 to 17 V Input and 3.3 V Output, -40 to 85 degC, 16-Pin QFN (RGT), Green (RoHS & no Sb/Br)	U5	1	Texas Instruments	TPS62142RGTT	Volume Production	Mouser	595-TPS62142RGTT	1.72	1.72
BNO055	IMU ACCEL/GYRO/MAG I2C 28LGA	U6	1	Bosch	BNO055	Unknown				
SN74AHCT08PWR	IC GATE AND 4CH 2-INP 14TSSOP	U7	1	Texas Instruments	SN74AHCT08PWR	Volume Production	Mouser	595-SN74AHCT08PWR	0.1678	0.1678
MS561101BA03-50	Barometric Pressure Sensor, 1.8 to 3.6 V, -40 to 85 degC, 8-Pin SMD, RoHS, Tape and Reel	U9	1	TE Connectivity	MS561101BA03-50	Volume Production	Mouser	824-MS561101BA03-50	8.21	8.21
nRF5340-QKAA	Multi-protocol Bluetooth Low Energy, IEEE 802.15.4, ANT and 2.4GHz proprietary system-on-chip	U10	1	Nordic Semiconductor	NRF5340-QKAA-R7	Unknown	Mouser	949-NRF5340-QKAA-R7	6.92	6.92
M95256-WMN6TP	IC EEPROM 256K SPI 20MHZ 8SO	U13	1	STMicroelectronics	M95P16-EXMNT/E	Manual Solution	Mouser	511-M95P16-EXMNT/E	1.17	1.17
ABS05-32.768KHZ-9-T	CRYSTAL 32.7680KHZ 9PF SMD	Y1, Y2	2	Abracon	ABS05-32.768KHZ-9-T	Volume Production	Mouser	815-ABS05-32.768K9T	0.71537	1.43
7M-32.000MEEQ-T	Crystal 32MHz, 10ppm, 10pF, 50Ω	Y3	1	TXC	7M-32.000MEEQ-T	Volume Production	Mouser	717-7M-32.000MEEQ-T	0.9715	0.9715

Design Rules Verification Report

Filename : C:\Users\Public\Documents\Altium\Opale\PCB1_2.PcbDoc

Warnings 8
Rule Violations 119

Warnings	
Unplated multi-layer pad(s) detected	8
Total	8

Rule Violations	
Clearance Constraint (Gap=0.09mm) (All),(All)	2
Clearance Constraint (Gap=0.46mm) (InNetClass('RF') AND (OnOutside OR OnMultiLayer)),((OnOutside OF	0
Clearance Constraint (Gap=0.55mm) (InNetClass('USB') AND (OnOutside OR OnMultiLayer)),((OnOutside OF	0
Short-Circuit Constraint (Allowed=No) (All),(All)	2
Un-Routed Net Constraint ((All))	3
Modified Polygon (Allow modified: No), (Allow shelved: No)	0
Width Constraint (Min=0.09mm) (Max=10mm) (Preferred=0.12mm) (All)	0
Routing Topology Rule(Topology=Shortest) (All)	0
Power Plane Connect Rule(Relief Connect)(Expansion=0.508mm) (Conductor Width=0.254mm) (Air Gap=0.254mm	0
Minimum Annular Ring (Minimum=0.05mm) (All)	0
Hole Size Constraint (Min=0.025mm) (Max=20mm) (All)	0
Hole To Hole Clearance (Gap=0.198mm) (All),(All)	0
Minimum Solder Mask Sliver (Gap=0.09mm) (All),(All)	0
Silk To Solder Mask (Clearance=0.1mm) (IsPad),(All)	8
Silk to Silk (Clearance=0.15mm) (All),(All)	6
Net Antennae (Tolerance=0mm) (All)	96
Board Clearance Constraint (Gap=0mm) (All)	0
Matched Lengths(Tolerance=0.254mm) (InNetClass('USB'))	0
Maximum Via Count Constraint (Limit=0) (InNetClass('USB'))	2
Maximum Via Count Constraint (Limit=0) (InNetClass('RF'))	0
Height Constraint (Min=0mm) (Max=25.4mm) (Prefered=12.7mm) (All)	0
Total	119

Unplated multi-layer pad(s) detected
Pad MH7-1(67mm,83.333mm) on Multi-Layer on Net GND
Pad MH8-1(67mm,120.5mm) on Multi-Layer on Net GND
Pad MH1-1(5.664mm,9mm) on Multi-Layer on Net GND
Pad MH6-1(67.325mm,46.614mm) on Multi-Layer on Net GND
Pad MH5-1(67mm,9mm) on Multi-Layer on Net GND
Pad MH3-1(5.664mm,83.333mm) on Multi-Layer on Net GND
Pad MH4-1(5.664mm,120.5mm) on Multi-Layer on Net GND
Pad MH2-1(5.664mm,46.167mm) on Multi-Layer on Net GND

Clearance Constraint (Gap=0.09mm) (All),(All)
Clearance Constraint: (Collision < 0.09mm) Between Area Fill (70.396mm,65.88mm) (70.896mm,71.28mm) on Top And Pad ANT2-1(67.945mm,68.58mm) on Top
Clearance Constraint: (Collision < 0.09mm) Between Area Fill (70.396mm,65.88mm) (70.896mm,71.28mm) on Top And Track (62.23mm,68.58mm)(67.945mm,68.58mm) on Top

Short-Circuit Constraint (Allowed=No) (All),(All)
Short-Circuit Constraint: Between Area Fill (70.396mm,65.88mm) (70.896mm,71.28mm) on Top And Pad ANT2-1(67.945mm,68.58mm) on Top Location : [X = 99.071mm][Y = 99.58mm
Short-Circuit Constraint: Between Area Fill (70.396mm,65.88mm) (70.896mm,71.28mm) on Top And Track (62.23mm,68.58mm)(67.945mm,68.58mm) on Top Location : [X = 98.986mm][Y = 99.58mm

Un-Routed Net Constraint ((All))
Un-Routed Net Constraint: Arc (62mm,30mm) on Bot Dead Copper - Net Not Assigned
Un-Routed Net Constraint: Track (60mm,28mm)(60mm,33.715mm) on Bot Dead Copper - Net Not Assigned
Un-Routed Net Constraint: Track (64mm,28mm)(64mm,33.715mm) on Bot Dead Copper - Net Not Assigned

Silk To Solder Mask (Clearance=0.1mm) (IsPad),(All)
Silk To Solder Mask Clearance Constraint: (Collision < 0.1mm) Between Area Fill (20.034mm,79.8mm) (20.542mm,81.387mm) on Top Overlay And Pad R22-1(21.59mm,81.28mm) on Top [Top Overlay] to [Top Solde
Silk To Solder Mask Clearance Constraint: (0.06mm < 0.1mm) Between Area Fill (20.034mm,79.8mm) (20.542mm,81.387mm) on Top Overlay And Pad R22-2(21.59mm,79.83mm) on Top [Top Overlay] to [Top Solde
Silk To Solder Mask Clearance Constraint: (0.063mm < 0.1mm) Between Area Fill (24.79mm,18.238mm) (25.298mm,19.825mm) on Top Overlay And Pad R31-2(25mm,17.725mm) on Top [Top Overlay] to [Top Solde
Silk To Solder Mask Clearance Constraint: (Collision < 0.1mm) Between Area Fill (32.798mm,109.113mm) (33.306mm,110.7mm) on Top Overlay And Pad R61-2(34.169mm,110.207mm) on Top [Top Overlay] to [Top Solde
Silk To Solder Mask Clearance Constraint: (Collision < 0.1mm) Between Pad C23-2(25.4mm,88.28mm) on Top And Text "SERVO 3" (26.029mm,93.5mm) on Top Overlay [Top Overlay] to [Top Solder] clearance [0mm
Silk To Solder Mask Clearance Constraint: (Collision < 0.1mm) Between Pad C27-2(26.67mm,88.28mm) on Top And Text "SERVO 3" (26.029mm,93.5mm) on Top Overlay [Top Overlay] to [Top Solder] clearance [0mm
Silk To Solder Mask Clearance Constraint: (0.017mm < 0.1mm) Between Pad C85-1(48.145mm,60.96mm) on Top And Text "C86" (46.853mm,61.771mm) on Top Overlay [Top Overlay] to [Top Solder] clearance [0.017mm
Silk To Solder Mask Clearance Constraint: (Collision < 0.1mm) Between Pad U10-A1(51.845mm,70.51mm) on Top And Region (0 hole(s)) Top Overlay [Top Overlay] to [Top Solder] clearance [0mm

Silk to Silk (Clearance=0.15mm) (All),(All)
Silk To Silk Clearance Constraint: (Collision < 0.15mm) Between Text "DEBUG UART" (72.782mm,50.551mm) on Top Overlay And Track (64.018mm,50.42mm)(71.638mm,50.42mm) on Top Overlay Silk Text to Silk Clearanc
Silk To Silk Clearance Constraint: (Collision < 0.15mm) Between Text "DEBUG UART" (72.782mm,50.551mm) on Top Overlay And Track (64.018mm,55.5mm)(71.638mm,55.5mm) on Top Overlay Silk Text to Silk Clearanc
Silk To Silk Clearance Constraint: (Collision < 0.15mm) Between Text "DEBUG UART" (72.782mm,50.551mm) on Top Overlay And Track (71.638mm,50.42mm)(71.638mm,55.5mm) on Top Overlay Silk Text to Silk Clearanc
Silk To Silk Clearance Constraint: (Collision < 0.15mm) Between Text "JTAG" (44.374mm,50.03mm) on Top Overlay And Track (45.085mm,49.53mm)(45.085mm,55.88mm) on Top Overlay Silk Text to Silk Clearance [0mn
Silk To Silk Clearance Constraint: (Collision < 0.15mm) Between Text "JTAG" (44.374mm,50.03mm) on Top Overlay And Track (45.085mm,49.53mm)(47.625mm,49.53mm) on Top Overlay Silk Text to Silk Clearance [0mn
Silk To Silk Clearance Constraint: (Collision < 0.15mm) Between Text "RX" (72.162mm,46.838mm) on Top Overlay And Track (69.215mm,50.165mm)(71.12mm,48.26mm) on Top Overlay Silk Text to Silk Clearance [0mn

Net Antennae (Tolerance=0mm) (All)
Net Antennae: Via (2.848mm,10.166mm) from Top to Bot
Net Antennae: Via (2.848mm,119.334mm) from Top to Bot
Net Antennae: Via (2.848mm,121.666mm) from Top to Bot
Net Antennae: Via (2.848mm,45.001mm) from Top to Bot
Net Antennae: Via (2.848mm,47.333mm) from Top to Bot
Net Antennae: Via (2.848mm,7.834mm) from Top to Bot
Net Antennae: Via (2.848mm,82.167mm) from Top to Bot
Net Antennae: Via (2.848mm,84.499mm) from Top to Bot
Net Antennae: Via (3.509mm,11.155mm) from Top to Bot
Net Antennae: Via (3.509mm,118.345mm) from Top to Bot
Net Antennae: Via (3.509mm,122.655mm) from Top to Bot
Net Antennae: Via (3.509mm,44.012mm) from Top to Bot
Net Antennae: Via (3.509mm,48.322mm) from Top to Bot
Net Antennae: Via (3.509mm,6.845mm) from Top to Bot
Net Antennae: Via (3.509mm,81.178mm) from Top to Bot
Net Antennae: Via (3.509mm,85.488mm) from Top to Bot
Net Antennae: Via (4.498mm,11.816mm) from Top to Bot
Net Antennae: Via (4.498mm,117.684mm) from Top to Bot
Net Antennae: Via (4.498mm,123.316mm) from Top to Bot
Net Antennae: Via (4.498mm,43.351mm) from Top to Bot
Net Antennae: Via (4.498mm,48.983mm) from Top to Bot
Net Antennae: Via (4.498mm,6.184mm) from Top to Bot
Net Antennae: Via (4.498mm,80.517mm) from Top to Bot
Net Antennae: Via (4.498mm,86.149mm) from Top to Bot
Net Antennae: Via (6.83mm,11.816mm) from Top to Bot
Net Antennae: Via (6.83mm,117.684mm) from Top to Bot
Net Antennae: Via (6.83mm,123.316mm) from Top to Bot
Net Antennae: Via (6.83mm,43.351mm) from Top to Bot
Net Antennae: Via (6.83mm,48.983mm) from Top to Bot
Net Antennae: Via (6.83mm,6.184mm) from Top to Bot
Net Antennae: Via (6.83mm,80.517mm) from Top to Bot
Net Antennae: Via (6.83mm,86.149mm) from Top to Bot
Net Antennae: Via (64.184mm,10.166mm) from Top to Bot
Net Antennae: Via (64.184mm,119.334mm) from Top to Bot
Net Antennae: Via (64.184mm,121.666mm) from Top to Bot
Net Antennae: Via (64.184mm,7.834mm) from Top to Bot

Net Antennae (Tolerance=0mm) (All)
Net Antennae: Via (64.184mm,82.167mm) from Top to Bot
Net Antennae: Via (64.184mm,84.499mm) from Top to Bot
Net Antennae: Via (64.509mm,45.448mm) from Top to Bot
Net Antennae: Via (64.509mm,47.78mm) from Top to Bot
Net Antennae: Via (64.845mm,11.155mm) from Top to Bot
Net Antennae: Via (64.845mm,118.345mm) from Top to Bot
Net Antennae: Via (64.845mm,122.655mm) from Top to Bot
Net Antennae: Via (64.845mm,6.845mm) from Top to Bot
Net Antennae: Via (64.845mm,81.178mm) from Top to Bot
Net Antennae: Via (64.845mm,85.488mm) from Top to Bot
Net Antennae: Via (65.17mm,44.459mm) from Top to Bot
Net Antennae: Via (65.17mm,48.769mm) from Top to Bot
Net Antennae: Via (65.834mm,11.816mm) from Top to Bot
Net Antennae: Via (65.834mm,117.684mm) from Top to Bot
Net Antennae: Via (65.834mm,123.316mm) from Top to Bot
Net Antennae: Via (65.834mm,6.184mm) from Top to Bot
Net Antennae: Via (65.834mm,80.517mm) from Top to Bot
Net Antennae: Via (65.834mm,86.149mm) from Top to Bot
Net Antennae: Via (66.159mm,43.798mm) from Top to Bot
Net Antennae: Via (66.159mm,49.43mm) from Top to Bot
Net Antennae: Via (68.166mm,11.816mm) from Top to Bot
Net Antennae: Via (68.166mm,117.684mm) from Top to Bot
Net Antennae: Via (68.166mm,123.316mm) from Top to Bot
Net Antennae: Via (68.166mm,6.184mm) from Top to Bot
Net Antennae: Via (68.166mm,80.517mm) from Top to Bot
Net Antennae: Via (68.166mm,86.149mm) from Top to Bot
Net Antennae: Via (68.491mm,43.798mm) from Top to Bot
Net Antennae: Via (68.491mm,49.43mm) from Top to Bot
Net Antennae: Via (69.155mm,11.155mm) from Top to Bot
Net Antennae: Via (69.155mm,118.345mm) from Top to Bot
Net Antennae: Via (69.155mm,122.655mm) from Top to Bot
Net Antennae: Via (69.155mm,6.845mm) from Top to Bot
Net Antennae: Via (69.155mm,81.178mm) from Top to Bot
Net Antennae: Via (69.155mm,85.488mm) from Top to Bot
Net Antennae: Via (69.48mm,44.459mm) from Top to Bot
Net Antennae: Via (69.48mm,48.769mm) from Top to Bot

Net Antennae (Tolerance=0mm) (All)
Net Antennae: Via (69.816mm,10.166mm) from Top to Bot
Net Antennae: Via (69.816mm,119.334mm) from Top to Bot
Net Antennae: Via (69.816mm,121.666mm) from Top to Bot
Net Antennae: Via (69.816mm,7.834mm) from Top to Bot
Net Antennae: Via (69.816mm,82.167mm) from Top to Bot
Net Antennae: Via (69.816mm,84.499mm) from Top to Bot
Net Antennae: Via (7.819mm,11.155mm) from Top to Bot
Net Antennae: Via (7.819mm,118.345mm) from Top to Bot
Net Antennae: Via (7.819mm,122.655mm) from Top to Bot
Net Antennae: Via (7.819mm,44.012mm) from Top to Bot
Net Antennae: Via (7.819mm,48.322mm) from Top to Bot
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Net Antennae: Via (70.141mm,47.78mm) from Top to Bot
Net Antennae: Via (8.48mm,10.166mm) from Top to Bot
Net Antennae: Via (8.48mm,119.334mm) from Top to Bot
Net Antennae: Via (8.48mm,121.666mm) from Top to Bot
Net Antennae: Via (8.48mm,45.001mm) from Top to Bot
Net Antennae: Via (8.48mm,47.333mm) from Top to Bot
Net Antennae: Via (8.48mm,7.834mm) from Top to Bot
Net Antennae: Via (8.48mm,82.167mm) from Top to Bot
Net Antennae: Via (8.48mm,84.499mm) from Top to Bot

Maximum Via Count Constraint (Limit=0) (InNetClass('USB'))
Maximum Via Count Constraint: Net USB_N (Via Count=2)
Maximum Via Count Constraint: Net USB_P (Via Count=2)