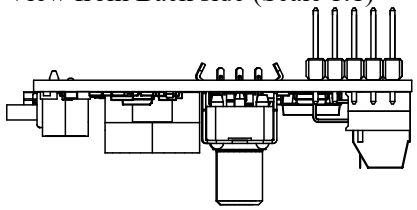
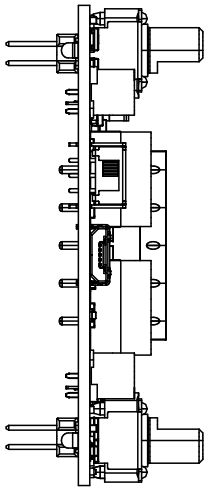
RELEASE HISTORY

REVISION	DESCRIPTION	DATE
v1.0	Initial Prototype	02/04/2021
-	- - - - -	--/--/----
-	- - - - -	--/--/----
-	- - - - -	--/--/----

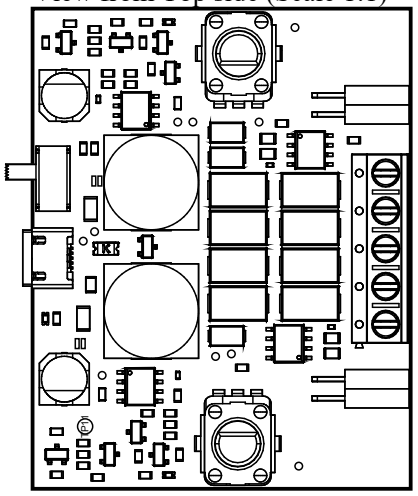
View from Back side (Scale 1:1)



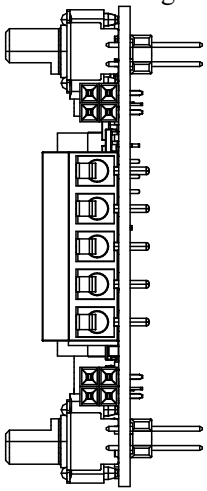
View from Left side (Scale 1:1)



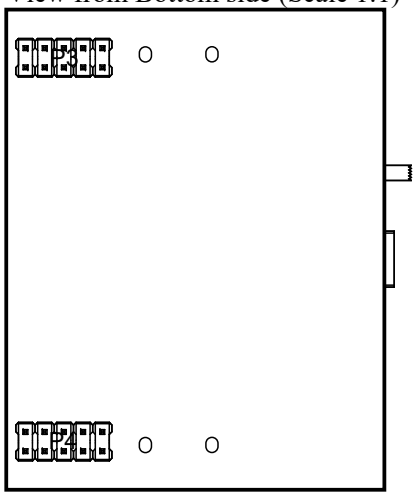
View from Top side (Scale 1:1)



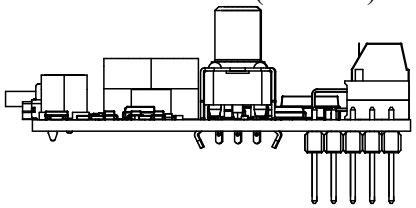
View from Right side (Scale 1:1)



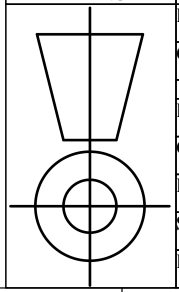
View from Bottom side (Scale 1:1)



View from Front side (Scale 1:1)



THIRD ANGLE



APPROVALS		DATE
ENGINEER:	LD STANTON	02/04/2021
CHECKER:	J PEAD	--/--/----

REFERENCE DOCUMENTS

BOM DOC:	Bill of Materials.csv
CPL DOC:	Pick and Place.csv
FAB DOC:	Fabrication.PCBDwf
SCH DOC:	Main.SchDoc
PCB DOC:	PCB.PcbDoc

UNIVERSITY OF CAPE TOWN
DEPARTMENT OF ELECTRICAL ENGINEERING
CAPE TOWN
SOUTH AFRICA

CONTACT: LAWRENCE STANTON STNLAW003@myuct.ac.za
ALTERNATIVE: JUSTIN PEAD justin.pead@uct.ac.za

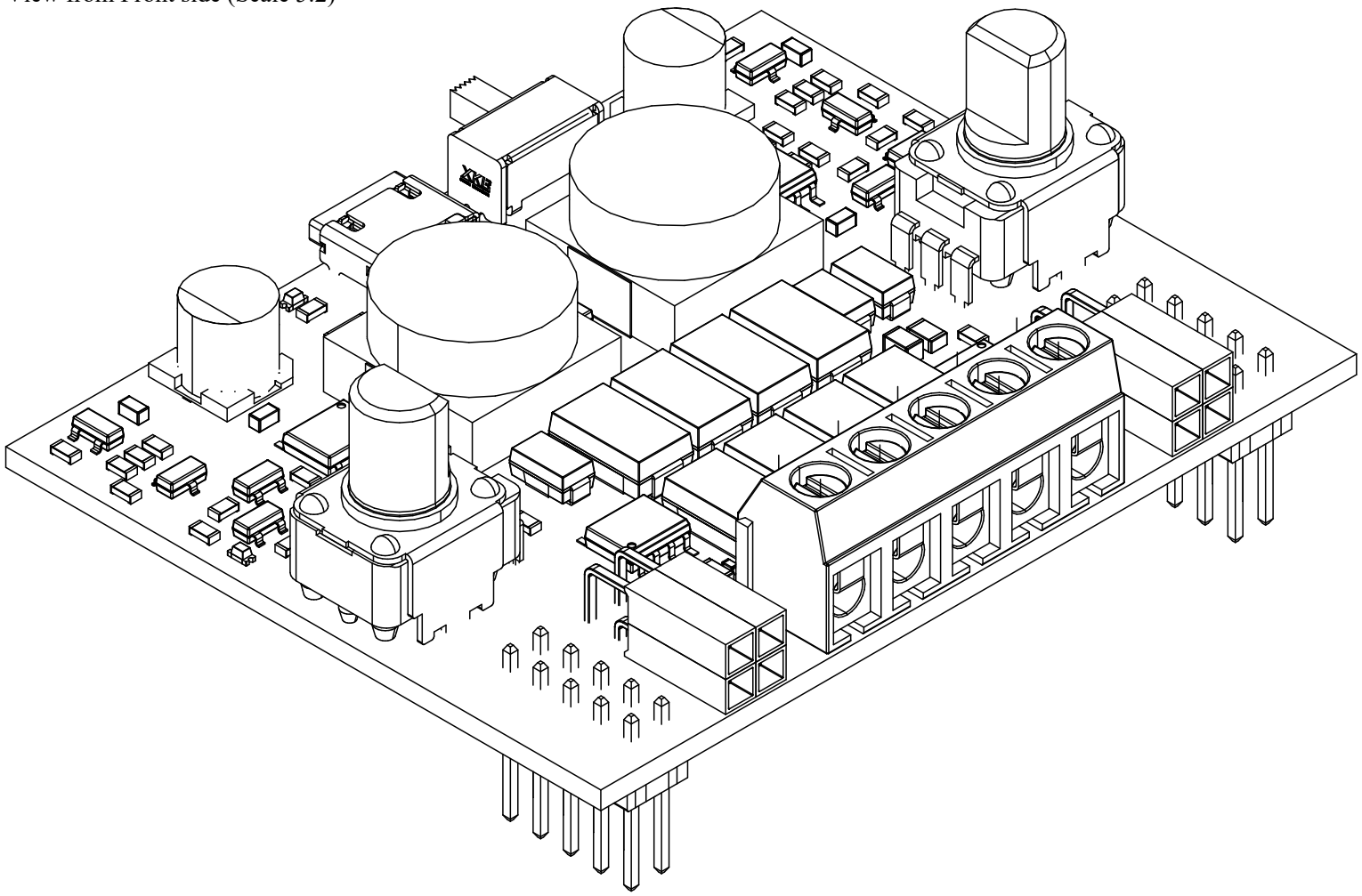
PROJECT: SIO2MKR.PrjPcb
REVISION: v1.0

TITLE: SIO2MKR
USB SPLIT RAIL POWER SUPPLY

SIZE: A4
DWG: ASSEMBLEY

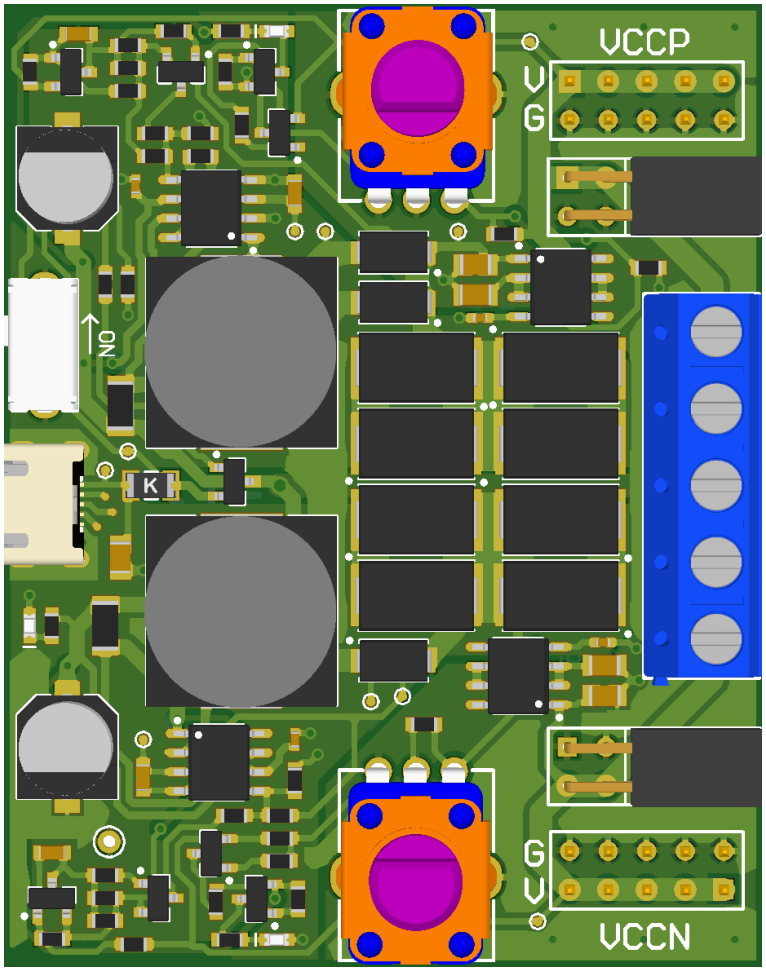
SCALE: 1:1
FILE: Assembley.PCBDwf
SHEET 1 OF 6

View from Front side (Scale 5:2)

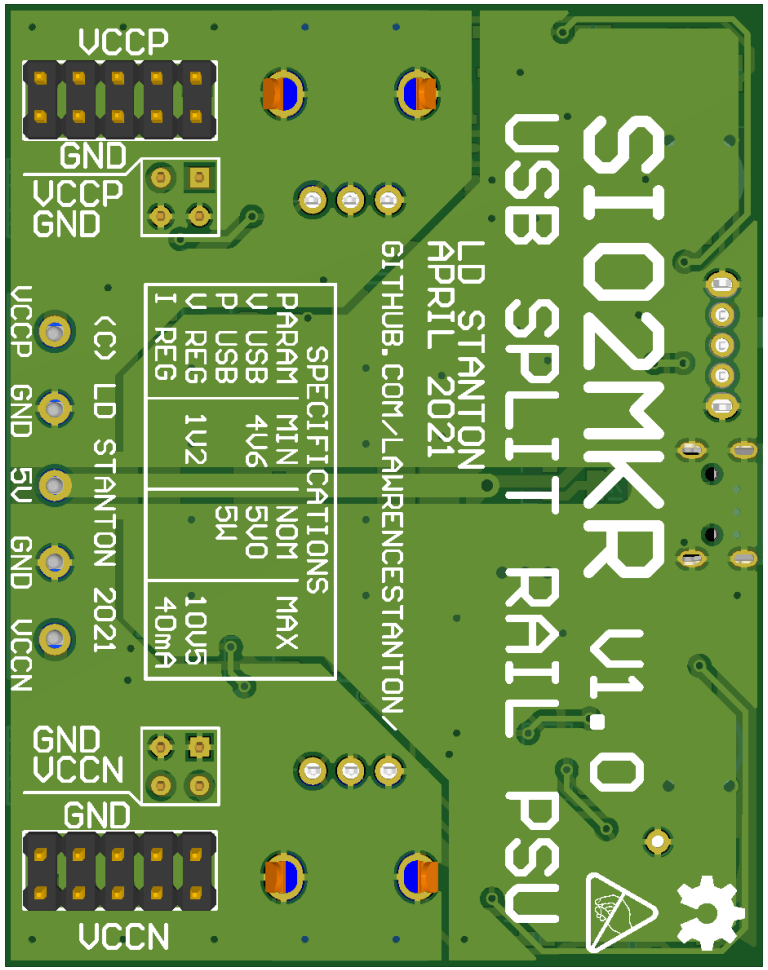


SIZE: A4	DWG:	ASSEMBLEY	
SCALE: 1:1	FILE: Assembley.PCBDwf		SHEET 2 OF 6

Realistic View

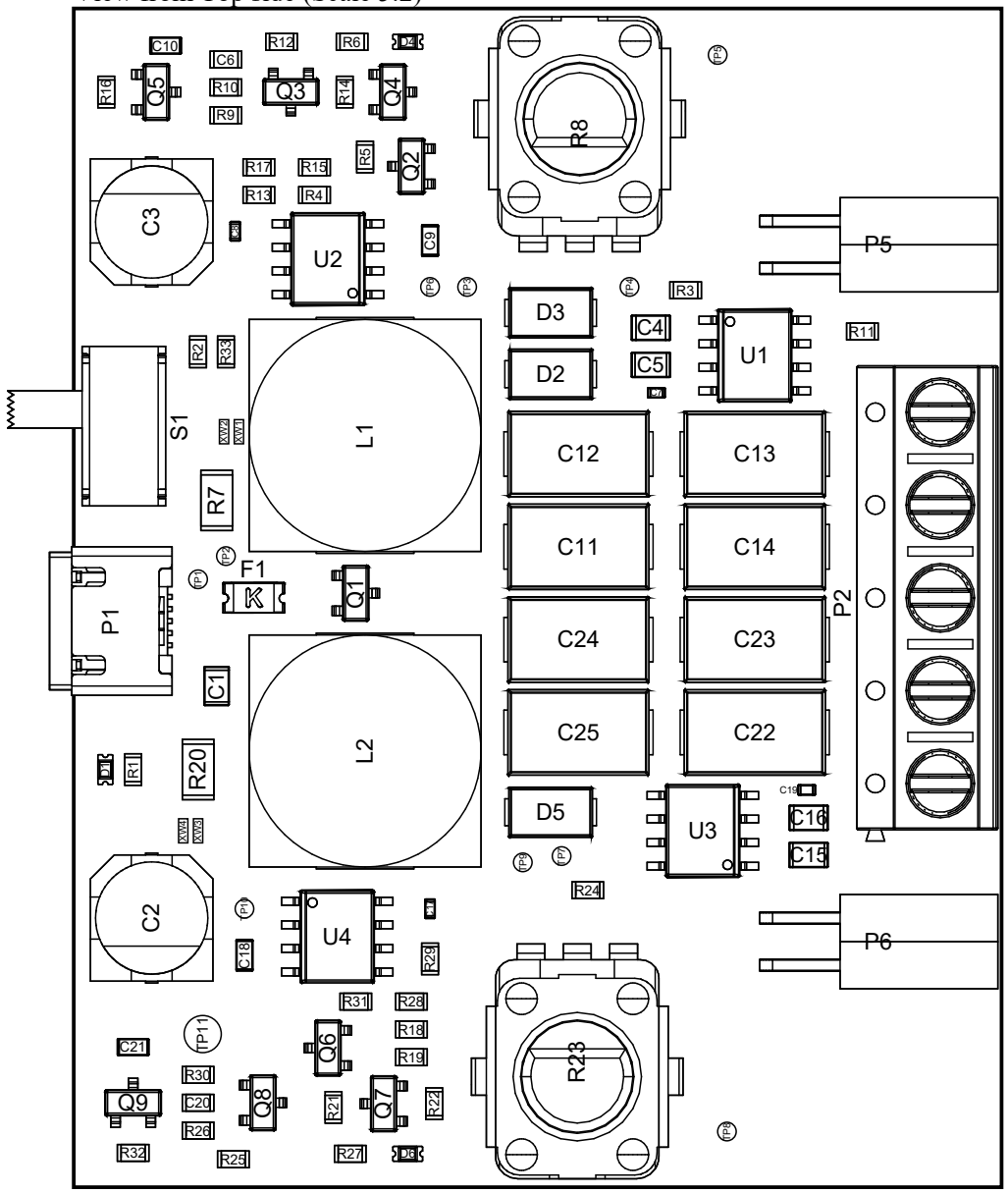


Realistic View



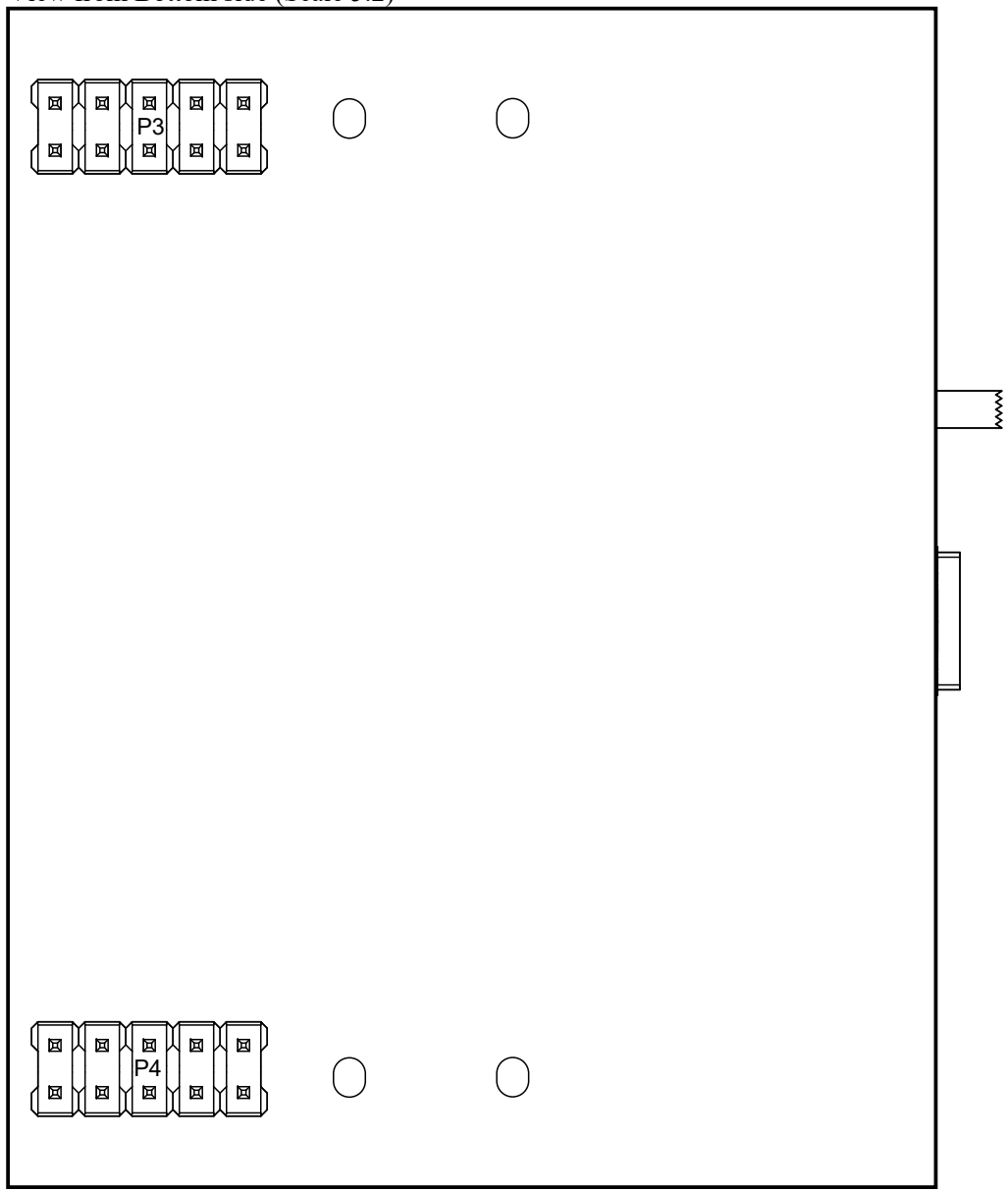
SIZE: A4	DWG:	ASSEMBLEY	
SCALE: 1:1	FILE:	Assembley.PCBDwf	SHEET 3 OF 6

View from Top side (Scale 5:2)



SIZE: A4	DWG: ASSEMBLEY	
SCALE: 1:1	FILE: Assembley.PCBDwf	SHEET 4 OF 6

View from Bottom side (Scale 5:2)



SIZE: A4	DWG: ASSEMBLEY		
SCALE: 1:1	FILE: Assembley.PCBDwf	SHEET 5 OF 6	

Bill Of Materials

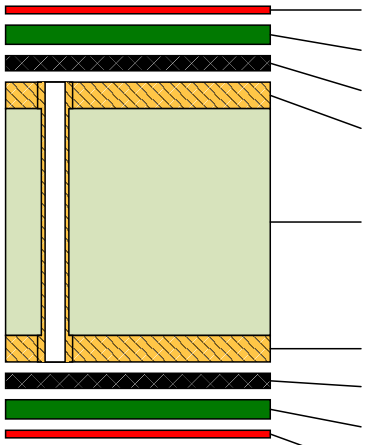
Line #	Designator	Comment	Quantity
1	C1	CL21B103KBANNNC	1
2	C2, C3	RVT1A221M0605	2
3	C4, C16	CC0805KRX7R9BB104	2
4	C5, C15	CL21B105KBFNNNE	2
5	C6, C20	CC0603KRX7R9BB104	2
6	C7, C19	0402CG3R3C500NT	2
7	C8, C17	CL05B104KO5NNNC	2
8	C9, C18	CL10A105KB8NNNC	2
9	C10, C21	CL10C100JB8NNNC	2
10	C11, C12, C13, C14, C22, C23, C24, C25	293D107X9016D2TE3	8
11	D1, D4, D6	19-217/GHC-YR1S2/3T	3
12	D2, D3, D5	SS34	3
13	F1	12H1300C	1
14	L1, L2	SWRB1207S-331MT	2
15	P1	MICRO 4P DIP	1
16	P2	CZM5,08-4E	1
17	P3, P4	A2541WV-2x5P	2
18	P5, P6	A2541HWR-2x2P	2
19	Q1	AO3401A	1
20	Q2, Q3, Q7	LBSS84LT1G	3
21	Q4, Q6, Q8	2N7002	3
22	Q5, Q9	SS8050	2
23	R1, R6, R27	0603WAF3300T5E	3
24	R2, R12, R21, R30	0603WAF1002T5E	4
25	R3, R18	0603WAF2400T5E	2
26	R4, R5, R19, R33	0603WAF1200T5E	4
27	R7, R20	1206W4F680LT5E	2
28	R8, R23	RK09K1130AU2	2
29	R9, R10, R25, R26	0603WAF2702T5E	4
30	R11, R24	0603WAF2701T5E	2
31	R13, R17, R28, R31	0603WAF5601T5E	4
32	R14, R22	0603WAF1003T5E	2
33	R15, R29	0603WAF5602T5E	2
34	R16, R32	0603WAF8201T5E	2
35	S1	SK12D07L4B	1
36	U1	LM317LBDR2G	1
37	U2, U4	MC34063ADR2G	2
38	U3	LM337LMX	1

SIZE: **A4**	DWG: **ASSEMBLEY**		
SCALE: **1:1**	FILE: **Assembley.PCBDwf**	SHEET 6 OF 6	

RELEASE HISTORY

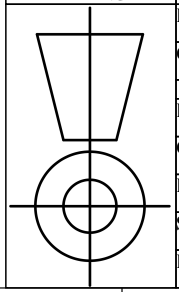
REVISION	DESCRIPTION	DATE
v1.0	Initial Prototype	02/04/2021
-	- - - - -	--/--/----
-	- - - - -	--/--/----
-	- - - - -	--/--/----

Layer Stack Legend



Material	Layer	Thickness	Dielectric Material	Type	Gerber
	Top Overlay			Legend	GTO
Surface Material	Top Solder	0.03mm	SM-001	Solder Mask	GTS
Lead-Free	Top Surface Finish	0.02mm		Surface Finish	
CF-004	**Top Layer**	**0.04mm**		**Signal**	**GTL**
Core		*1.44mm*	*FR-4*	*Dielectric*	
CF-004	**Bottom Layer**	**0.04mm**		**Signal**	**GBL**
Lead-Free	Bottom Surface Finish	0.02mm		Surface Finish	
Surface Material	Bottom Solder	0.03mm	SM-001	Solder Mask	GBS
	Bottom Overlay			Legend	GBO

Total thickness: 1.60mm

THIRD ANGLE	APPROVALS	DATE
	ENGINEER: LD STANTON	02/04/2021
	CHECKER: J PEAD	--/--/----
	REFERENCE DOCUMENTS	
	BOM DOC: Bill of Materials.csv	
	CPL DOC: Pick and Place.csv	
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	SCH DOC: Main.SchDoc	
	PCB DOC: PCB.PcbDoc	

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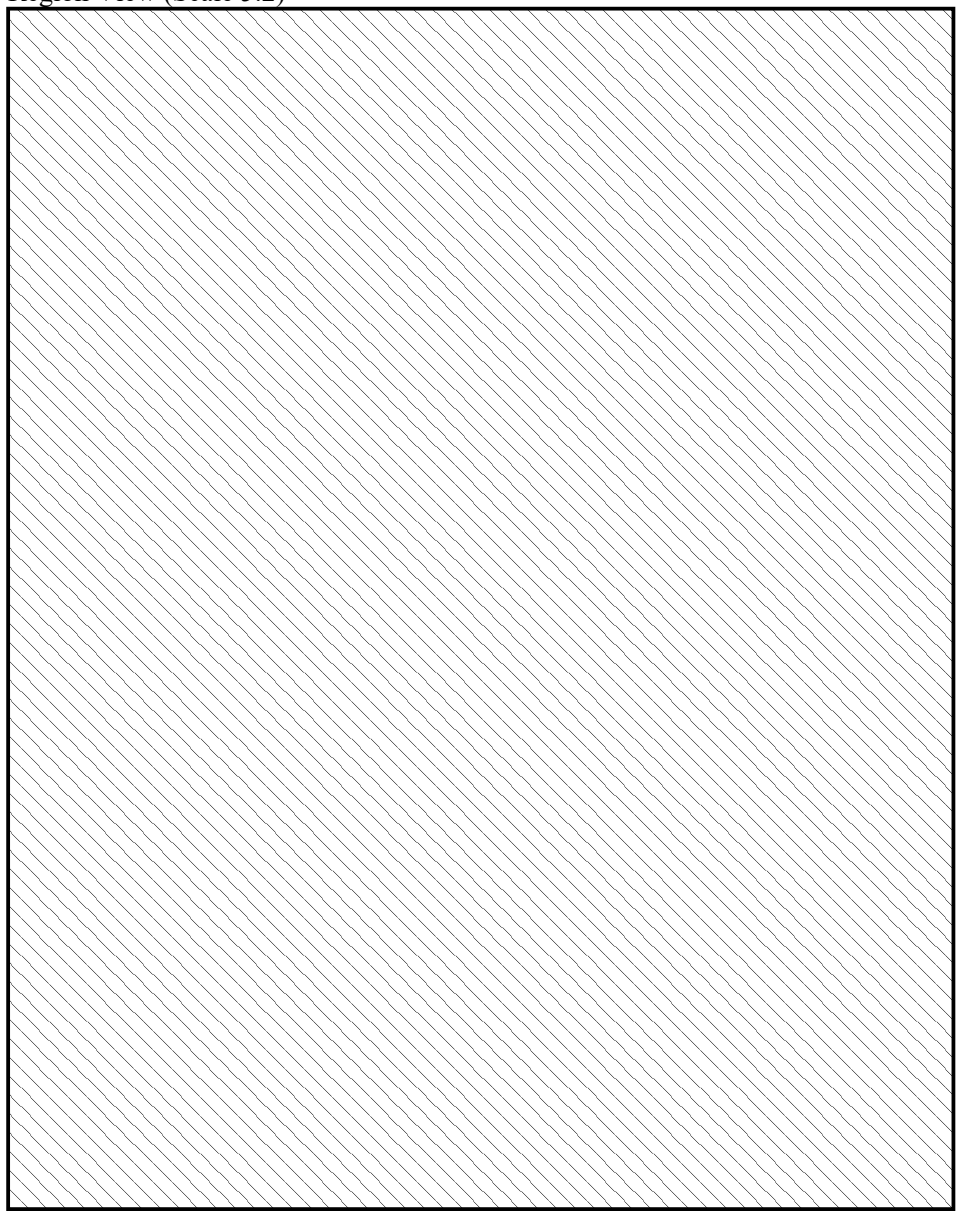
CAPE TOWN
SOUTH AFRICA

CONTACT: LAWRENCE STANTON STNLAW003@myuct.ac.za
ALTERNATIVE: JUSTIN PEAD justin.pead@uct.ac.za

PROJECT: SIO2MKR.PrjPcb
REVISION: v1.0
TITLE: SIO2MKR
USB SPLIT RAIL POWER SUPPLY
SIZE: **A4**
DWG: **FABRICATION**
SCALE: **1:1**
FILE: **Fabrication.PCBDwf**
SHEET 1 OF 10

Region View (Scale 5:2)



SIZE: A4	DWG: FABRICATION		
SCALE: 1:1	FILE: Fabrication.PCBDwf	SHEET 2 OF 10	

Transmission Line Structure Table

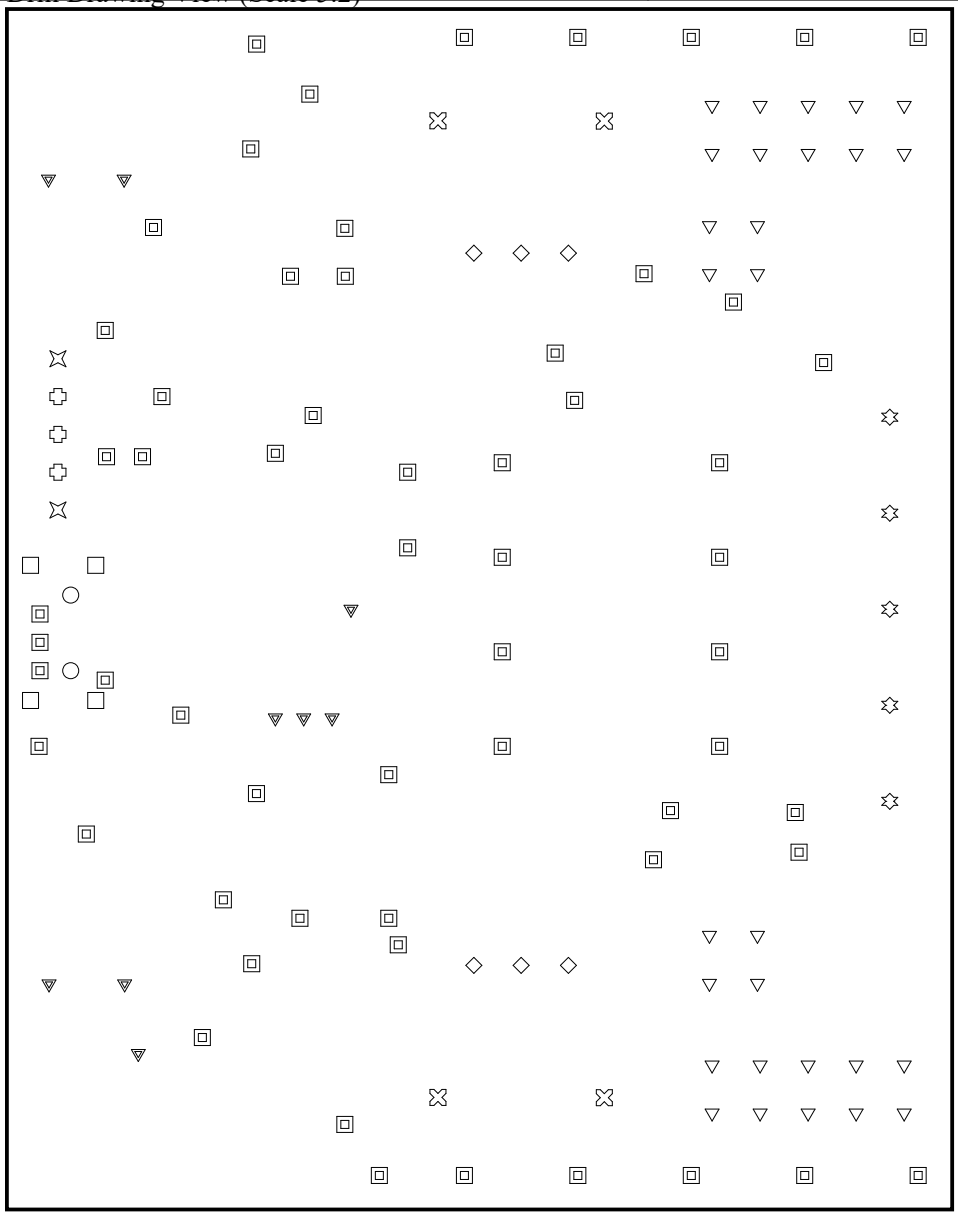
Impedance Id	Transmission Line	Target Impedance	Calculated Impedance	Trace layer	Wide Trace Width	Narrow Trace Width	Gap	Reference layers	Substack

Drill Table

Symbol	Count	Hole Size	Plated	Hole Type	Drill Layer Pair	Via / Pad	Pad Shape	Hole Tolerance	Hole Length
⧈	59	0.50mm(20mil)	Plated	Round	Top Layer - Bottom Layer	Via		+0.13mm(5mil)/-0.08mm(3mil)	
□	4	0.60mm(24mil)	Plated	Slot	Top Layer - Bottom Layer	Pad	Rounded	+0.13mm(5mil)/-0.08mm(3mil)	1.30mm(51mil)
▽	28	0.64mm(25mil)	Plated	Round	Top Layer - Bottom Layer	Pad	(Mixed)	+0.13mm(5mil)/-0.08mm(3mil)	
○	2	0.70mm(28mil)	Non-Plated	Round	Top Layer - Bottom Layer	Pad	Rounded	+0.13mm(5mil)/-0.08mm(3mil)	
⩛	9	0.80mm(31mil)	Plated	Round	Top Layer - Bottom Layer	(Mixed)	(Mixed)	+0.13mm(5mil)/-0.08mm(3mil)	
⌧	2	0.90mm(35mil)	Plated	Slot	Top Layer - Bottom Layer	Pad	Rounded	+0.13mm(5mil)/-0.08mm(3mil)	1.40mm(55mil)
⯎	3	0.91mm(36mil)	Plated	Round	Top Layer - Bottom Layer	Pad	Rounded	+0.13mm(5mil)/-0.08mm(3mil)	
◇	6	1.10mm(43mil)	Plated	Round	Top Layer - Bottom Layer	Pad	Rounded	+0.13mm(5mil)/-0.08mm(3mil)	
✡	5	1.20mm(47mil)	Plated	Round	Top Layer - Bottom Layer	Pad	Rounded	+0.13mm(5mil)/-0.08mm(3mil)	
⊠	4	1.80mm(71mil)	Plated	Slot	Top Layer - Bottom Layer	Pad	Rounded	+0.13mm(5mil)/-0.08mm(3mil)	2.20mm(87mil)
	122 Total								

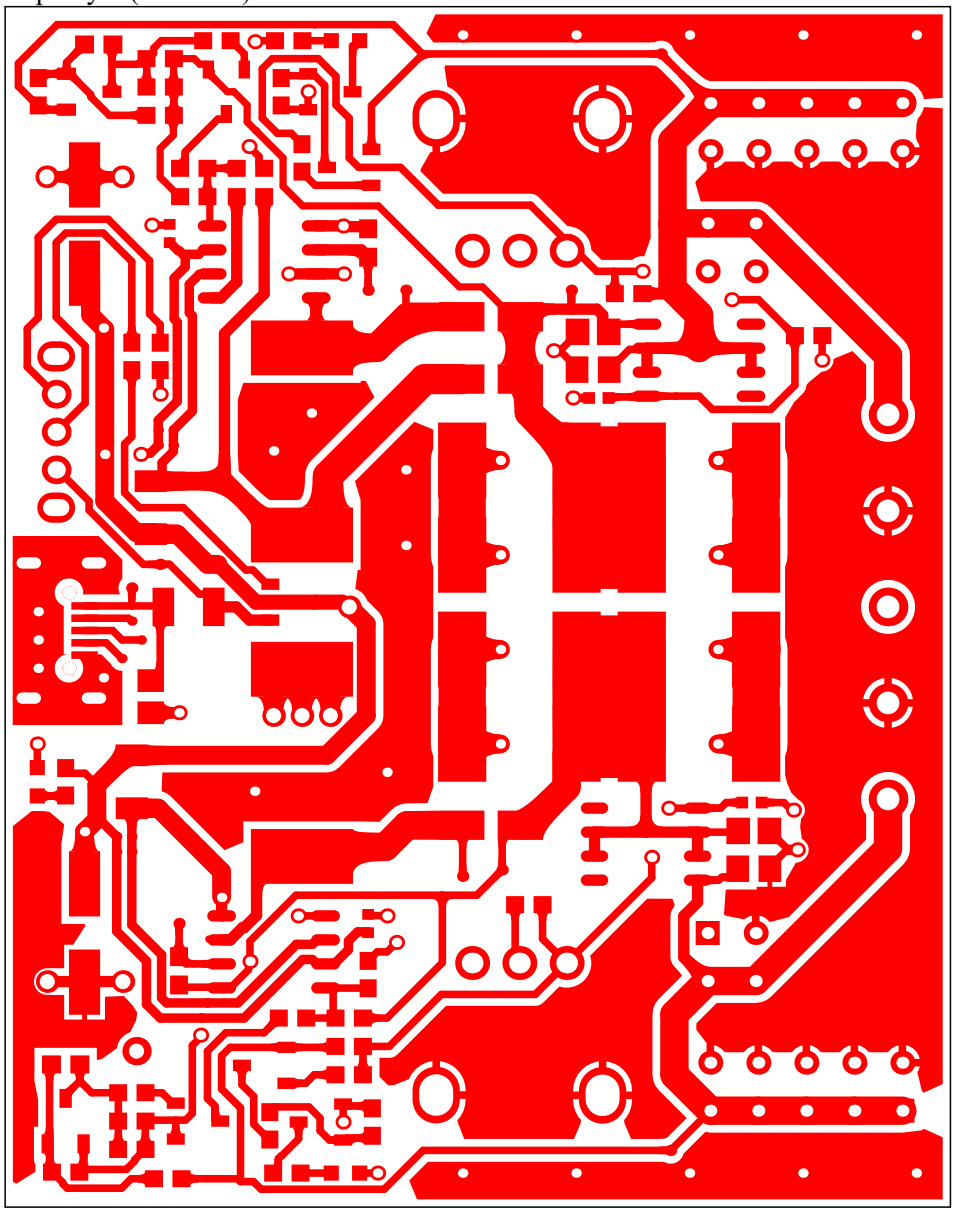
SIZE: A4	DWG: FABRICATION	
SCALE: 1:1	FILE: Fabrication.PCBDwf	SHEET 3 OF 10

Drill Drawing View (Scale 5:2)



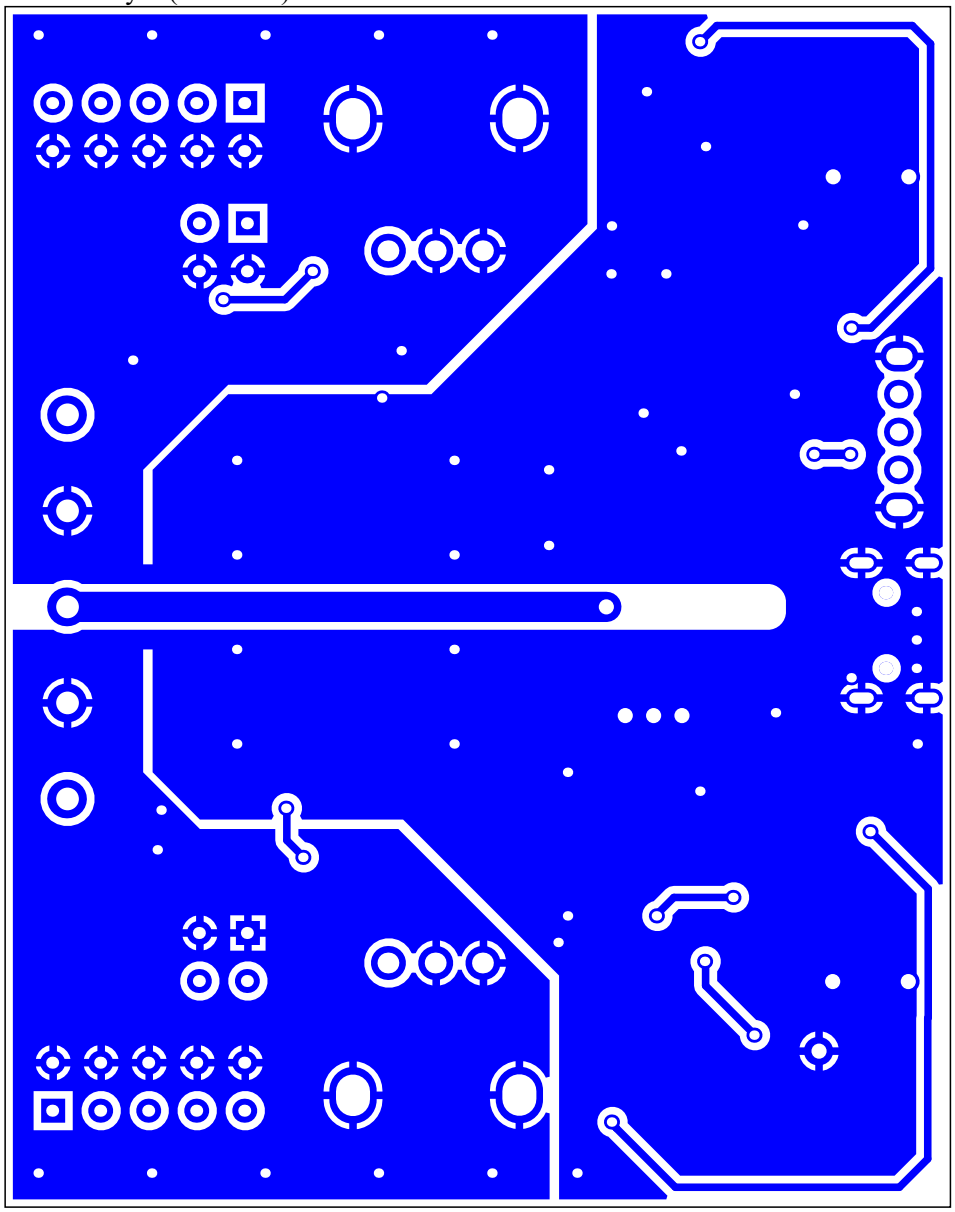
SIZE: A4	DWG:	FABRICATION	
SCALE: 1:1	FILE:	Fabrication.PCBDwf	SHEET 4 OF 10

Top Layer (Scale 5:2)



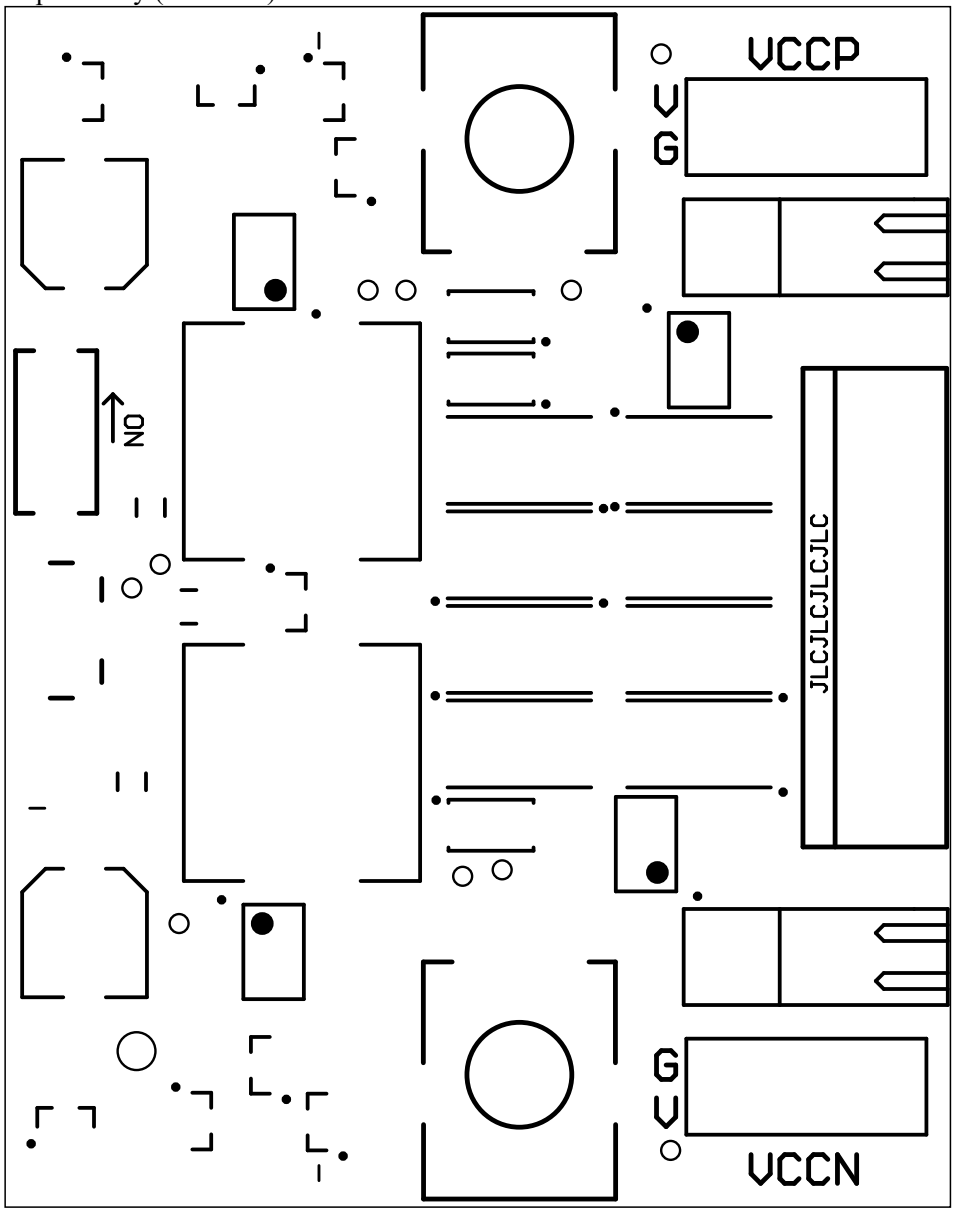
SIZE: A4		DWG: FABRICATION	
SCALE: 1:1	FILE: Fabrication.PCBDwf		SHEET 5 OF 10

Bottom Layer (Scale 5:2)



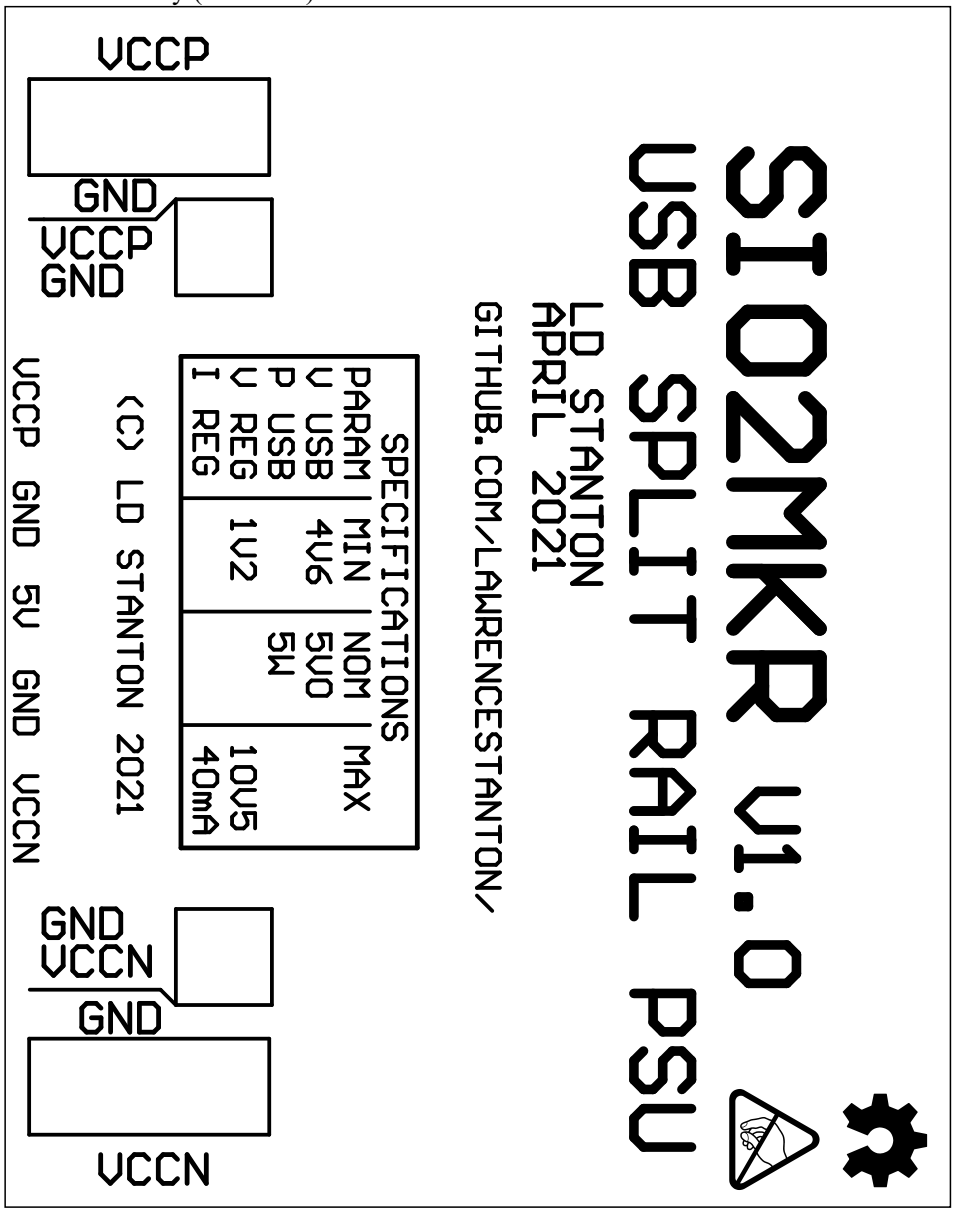
SIZE: A4	DWG:	FABRICATION	
SCALE: 1:1	FILE:	Fabrication.PCBDwf	SHEET 6 OF 10

Top Overlay (Scale 5:2)



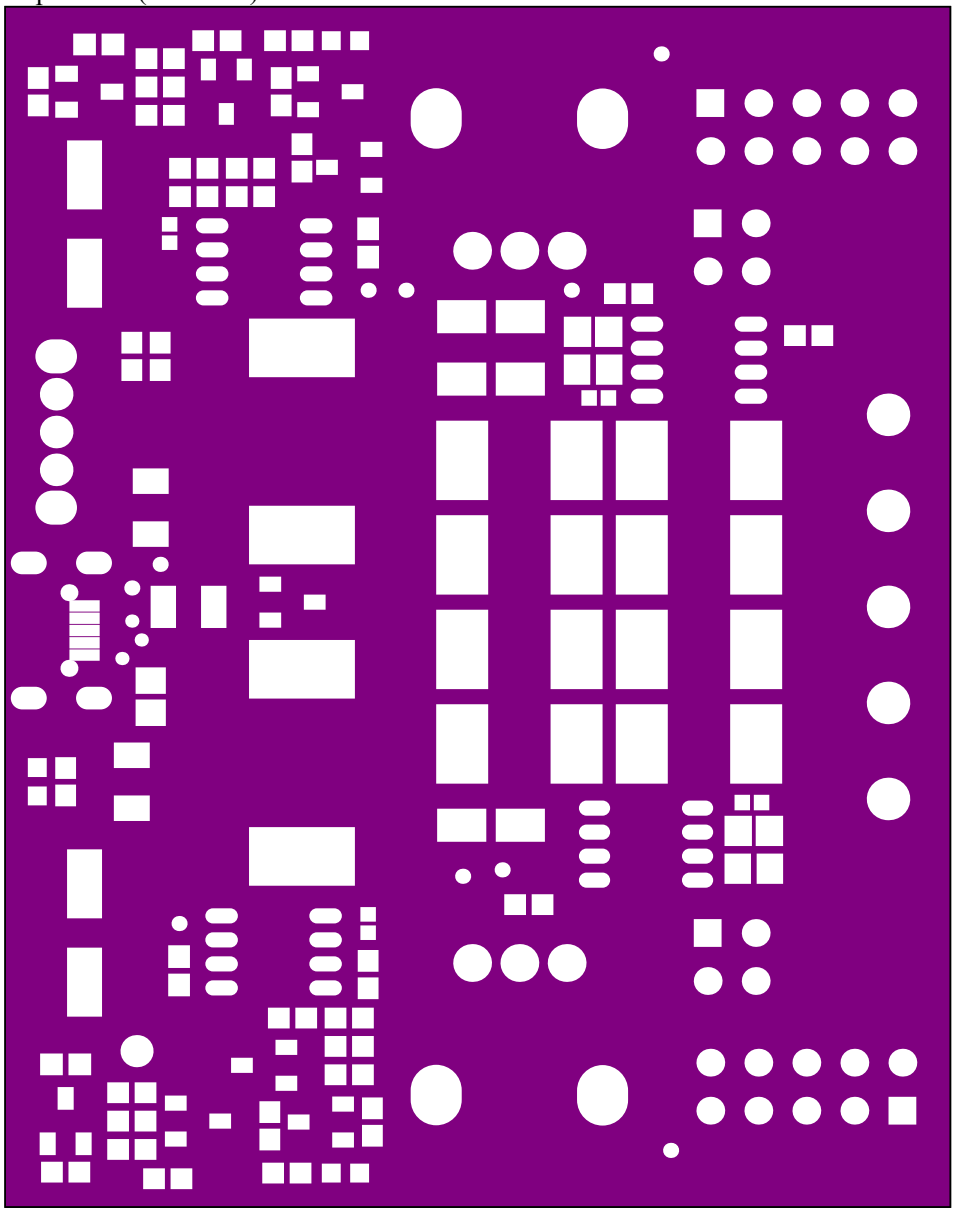
SIZE: A4	DWG:	FABRICATION	
SCALE: 1:1	FILE:	Fabrication.PCBDwf	SHEET 7 OF 10

Bottom Overlay (Scale 5:2)



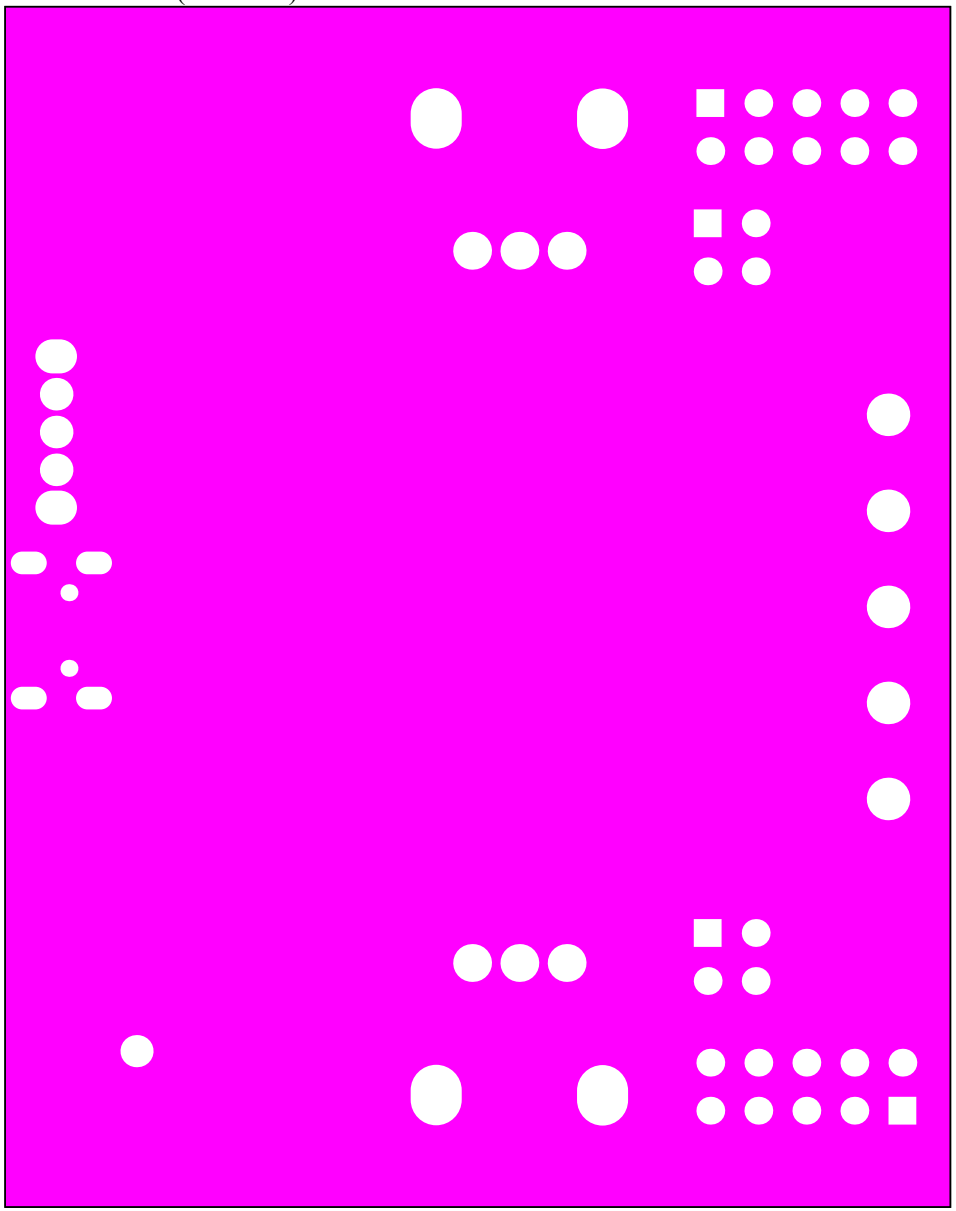
SIZE: A4	DWG: FABRICATION	
SCALE: 1:1	FILE: Fabrication.PCBDwf	SHEET 8 OF 10

Top Solder (Scale 5:2)



SIZE: A4	DWG: FABRICATION	
SCALE: 1:1	FILE: Fabrication.PCBDwf	SHEET 9 OF 10

Bottom Solder (Scale 5:2)



SIZE: A4	DWG: FABRICATION	
SCALE: 1:1	FILE: Fabrication.PCBDwf	SHEET 10 OF 10

5W USB DC In and Power Switch

P1 MICRO 4P DIP (Micro USB, CRITICAL): VCC, D-, D+, ID, GND, SHIELD
PP5V0_G3H_USB, USB_DN, USB_DP, USB_ID
C1 10nF X7R 0805 50V CRITICAL
F1 12H1300C 3A0 63V 1206 CRITICAL
PP5V0_G3H_FUSE
S1 SK12D07L4B (MH) 50V 0A3 CRITICAL
R33 120R ±1% 0.1W 0603 CRITICAL
Q1 AO3401A SOT-23-3 CRITICAL
SW_G, SW_T
R2 10K ±1% 0.1W 0603 CRITICAL
PP5V0_S0
C2 220uF AIEJ CAPAE 10V CRITICAL
C3 220uF AIEJ CAPAE 10V CRITICAL
R1 330R ±1% 0.1W 0603 CRITICAL
5V_LED_A
D1 19-217/GHC-YR1S2/3T Green 0603 25mA CRITICAL
GND

Breadboard Pin Headers

P3 A2541WV-2x5P Header CRITICAL
P4 A2541WV-2x5P Header CRITICAL

Auxiliary Pin Headers

P5 A2541HWR-2x2P Header CRITICAL
P6 A2541HWR-2x2P Header CRITICAL

Screw Terminals

P2 CZM5,08-4E CRITICAL

14V Bosting Supply

D2 SS34 3A0 40V DO-214AC CRITICAL
BOOST_VCC
L1 SWRB1207S-331MT 330uH ±20% 0A95 640mR CRITICAL
PP5V0_S0
R4 120R ±1% 0.1W 0603 CRITICAL
BOOST_DRIVE
U2 MC34063ADR2G CRITICAL: DRIVE, SWC, SENCE, SWE, VCC, TIMC, COMP, GND; S Q R; Ipk OSC CT; 1V25 REF
BOOST_SWITCH
R7 0R68 ±1% 0.25W 1206 CRITICAL
XW1, XW2
BOOST_VCC_N, BOOST_VCC_P
C8 100nF X7R 0402 16V CRITICAL
C9 1uF X5R 0603 50V CRITICAL
D3 SS34 3A0 40V DO-214AC CRITICAL
BOOST_FB
R13 5K6 ±1% 0.1W 0603 CRITICAL
C11, C12, C13, C14 100uF Tant MOULDED 16V CRITICAL
R15 56K ±1% 0.1W 0603 CRITICAL
R17 5K6 ±1% 0.1W 0603 CRITICAL
BOOST_VF_FB

Adjustable Positive Linear Regulator

PP_VTRACK_S0
U1 LM317LBDR2G CRITICAL: VIN, VOUT, NC, ADJ
LM317_NC_1, LM317_NC_2
C4 50V 0805 100nF DNP X7R
PP_VREG_S0
C5 1uF X7R 0805 50V CRITICAL
R3 240R ±1% 0.1W 0603 CRITICAL
R5 120R ±1% 0.1W 0603 CRITICAL
Q2 LBSS84LT1G SOT-23-3 CRITICAL

Positive ON LED

PP5V0_S0
R6 330R ±1% 0.1W 0603 CRITICAL
D4 19-217/GHC-YR1S2/3T Green 0603 25mA CRITICAL
Q4 2N7002 SOT-23-3 CRITICAL
R14 100K ±1% 0.1W 0603 CRITICAL

3V0 Tracking Feedback

R9 27K ±1% 0.1W 0603 CRITICAL
R10 27K ±1% 0.1W 0603 CRITICAL
C6 100nF X7R 0603 50V CRITICAL
C10 10pF C0G 0603 50V DNP
R12 10K ±1% 0.1W 0603 CRITICAL
Q3 LBSS84LT1G SOT-23-3 CRITICAL
Q5 SS8050 25V 1A5 300mW CRITICAL
R16 8K2 ±1% 0.1W 0603 CRITICAL
PREG_ADJ
-3dB at > 20kHz
R11 2K7 ±1% 0.1W 0603 CRITICAL
C7 3.3pF C0G 0402 50V CRITICAL
R8 RK09K1130AU2 5K CRITICAL

14V Inverting Supply

INV_SENCE
PP5V0_S0
U4 MC34063ADR2G CRITICAL: DRIVE, SWC, SENCE, SWE, VCC, TIMC, COMP, GND; S Q R; Ipk OSC CT; 1V25 REF
R20 0R68 ±1% 0.25W 1206 CRITICAL
XW3, XW4
INV_VCC_N, INV_VCC_P
C17 100nF X7R 0402 16V CRITICAL
INV_SWITCH
L2 SWRB1207S-331MT 330uH ±20% 0A95 640mR CRITICAL
C18 1uF X5R 0603 50V CRITICAL
D5 SS34 3A0 40V DO-214AC CRITICAL
INV_FB
R28 5K6 ±1% 0.1W 0603 CRITICAL
R29 56K ±1% 0.1W 0603 CRITICAL
R31 5K6 ±1% 0.1W 0603 CRITICAL
C22, C23, C24, C25 100uF Tant MOULDED 16V CRITICAL

Adjustable Negative Linear Regulator

PN_VTRACK_S0
U3 LM337LMX CRITICAL: VIN, VOUT, NC, ADJ
LM337_NC_1, LM337_NC_2
C16 50V 0805 100nF DNP X7R
PN_VREG_S0
C15 1uF X7R 0805 50V CRITICAL
R18 240R ±1% 0.1W 0603 CRITICAL
R19 120R ±1% 0.1W 0603 CRITICAL
Q6 2N7002 SOT-23-3 CRITICAL

Negative ON LED

PP5V0_S0
R21 10K ±1% 0.1W 0603 CRITICAL
R22 100K ±1% 0.1W 0603 CRITICAL
Q7 LBSS84LT1G SOT-23-3 CRITICAL
R27 330R ±1% 0.1W 0603 CRITICAL
D6 19-217/GHC-YR1S2/3T Green 0603 25mA CRITICAL

3V0 Tracking Feedback

R25 27K ±1% 0.1W 0603 CRITICAL
R26 27K ±1% 0.1W 0603 CRITICAL
C20 100nF X7R 0603 50V CRITICAL
C21 10pF C0G 0603 50V DNP
R30 10K ±1% 0.1W 0603 CRITICAL
Q8 2N7002 SOT-23-3 CRITICAL
Q9 SS8050 25V 1A5 300mW CRITICAL
R32 8K2 ±1% 0.1W 0603 CRITICAL
NREG_ADJ
R24 2K7 ±1% 0.1W 0603 CRITICAL
C19 3.3pF C0G 0402 50V CRITICAL
R23 RK09K1130AU2 5K CRITICAL

Scope GND Reference

GND

Approvals	Date
Engineer: LD Stanton	--/--/----
Checker: JC Pead	--/--/----

Reference Documents	
PCB Doc:	PCB.PcbDoc
FAB Doc:	TBD
ASM Doc:	TBD
CPL Doc:	TBD
BOM Doc:	TBD

USB Split Rail Power Supply

Main Schematic

Size: A3	Number: 1	Revision: v1.0
Date: 2021/04/02	Time: 23:59:16	Sheet 1 of 1
File: Main.SchDoc		Author: LD Stanton

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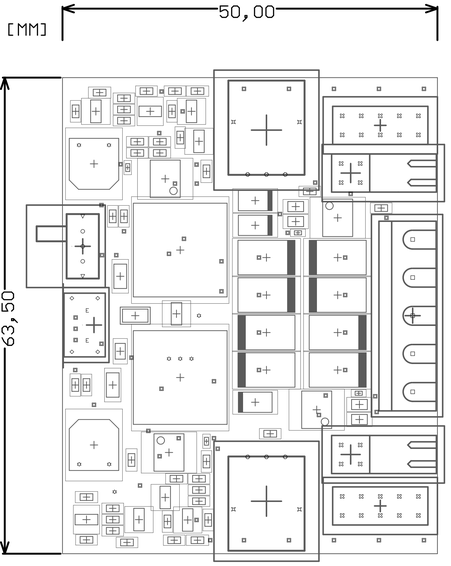

Layer	Name	Material	Thickness	Constant
	Top Overlay			
	Top Solder	SM-001	0,025mm	4
	Top Surface Finish	Lead-Free	0,020mm	
1	Top Layer	CF-004	0,035mm	
	Dielectric 1	FR-4	1,439mm	4.5
2	Bottom Layer	CF-004	0,035mm	
	Bottom Surface Finish	Lead-Free	0,020mm	
	Bottom Solder	SM-001	0,025mm	4
	Bottom Overlay			
Total board thickness:			1,600mm	

Symbol	Count	Hole Size	Plated	Hole Type	Drill Layer Pair	Via/Pad	Pad Shape	Template	Hole Tolerance (+)	Hole Tolerance (-)
⧈	59	0,500mm (19,69mil)	PTH	Round	Top Layer - Bottom Layer	Via	Rounded	v80h50m0mx0(Tol13-8)	0,130mm (5,12mil)	0,080mm (3,15mil)
◇	4	0,600mm (23,62mil)	PTH	Slot	Top Layer - Bottom Layer	Pad	Rounded	r100_170h60_130r100(Tol13-8)	0,130mm (5,12mil)	0,080mm (3,15mil)
⊠	28	0,635mm (25,00mil)	PTH	Round	Top Layer - Bottom Layer	Pad	(Mixed)	(Mixed)	0,130mm (5,12mil)	0,080mm (3,15mil)
E	2	0,700mm (27,56mil)	NPTH	Round	Top Layer - Bottom Layer	Pad	Rounded	c70hn70(Tol13-8)	0,130mm (5,12mil)	0,080mm (3,15mil)
✡	9	0,800mm (31,50mil)	PTH	Round	Top Layer - Bottom Layer	(Mixed)	Rounded	(Mixed)	0,130mm (5,12mil)	0,080mm (3,15mil)
▽	2	0,900mm (35,43mil)	PTH	Slot	Top Layer - Bottom Layer	Pad	Rounded	r160_200h90_140r100(Tol13-8)	0,130mm (5,12mil)	0,080mm (3,15mil)
○	3	0,914mm (36,00mil)	PTH	Round	Top Layer - Bottom Layer	Pad	Rounded	c152h91(Tol13-8)	0,130mm (5,12mil)	0,080mm (3,15mil)
✪	6	1,100mm (43,31mil)	PTH	Round	Top Layer - Bottom Layer	Pad	Rounded	c180h110(Tol13-8)	0,130mm (5,12mil)	0,080mm (3,15mil)
□	5	1,200mm (47,24mil)	PTH	Round	Top Layer - Bottom Layer	Pad	Rounded	c205h120(Tol13-8)	0,130mm (5,12mil)	0,080mm (3,15mil)
⧓	4	1,800mm (70,87mil)	PTH	Slot	Top Layer - Bottom Layer	Pad	Rounded	r250_300h180_220r100(Tol13-8)	0,130mm (5,12mil)	0,080mm (3,15mil)
	122 Total									

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