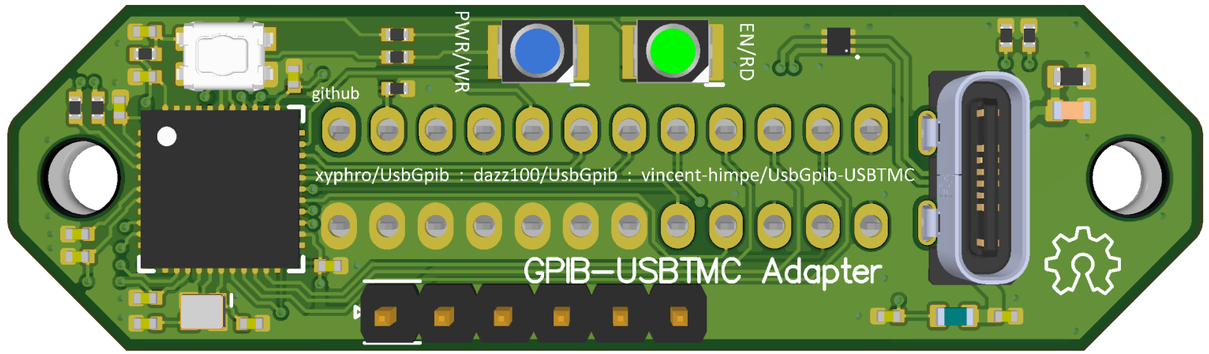
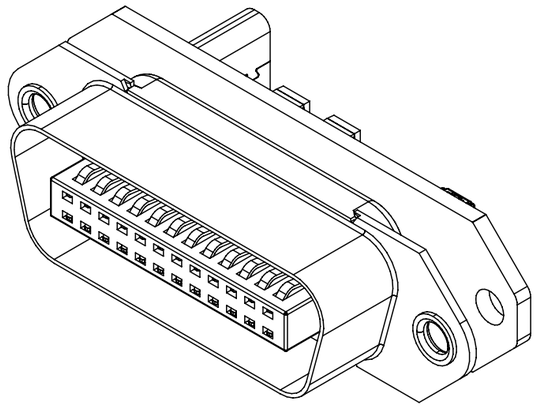
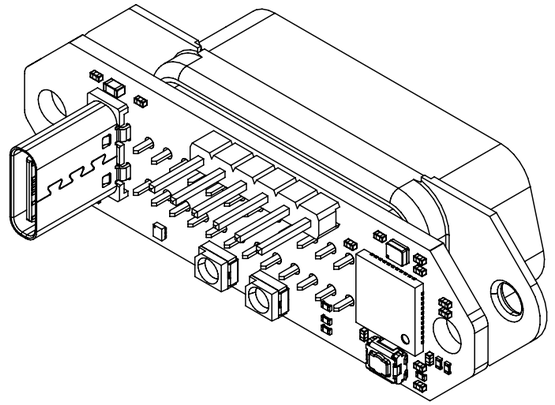
USBgpib-USBTMC-V3mini.PrjPcb



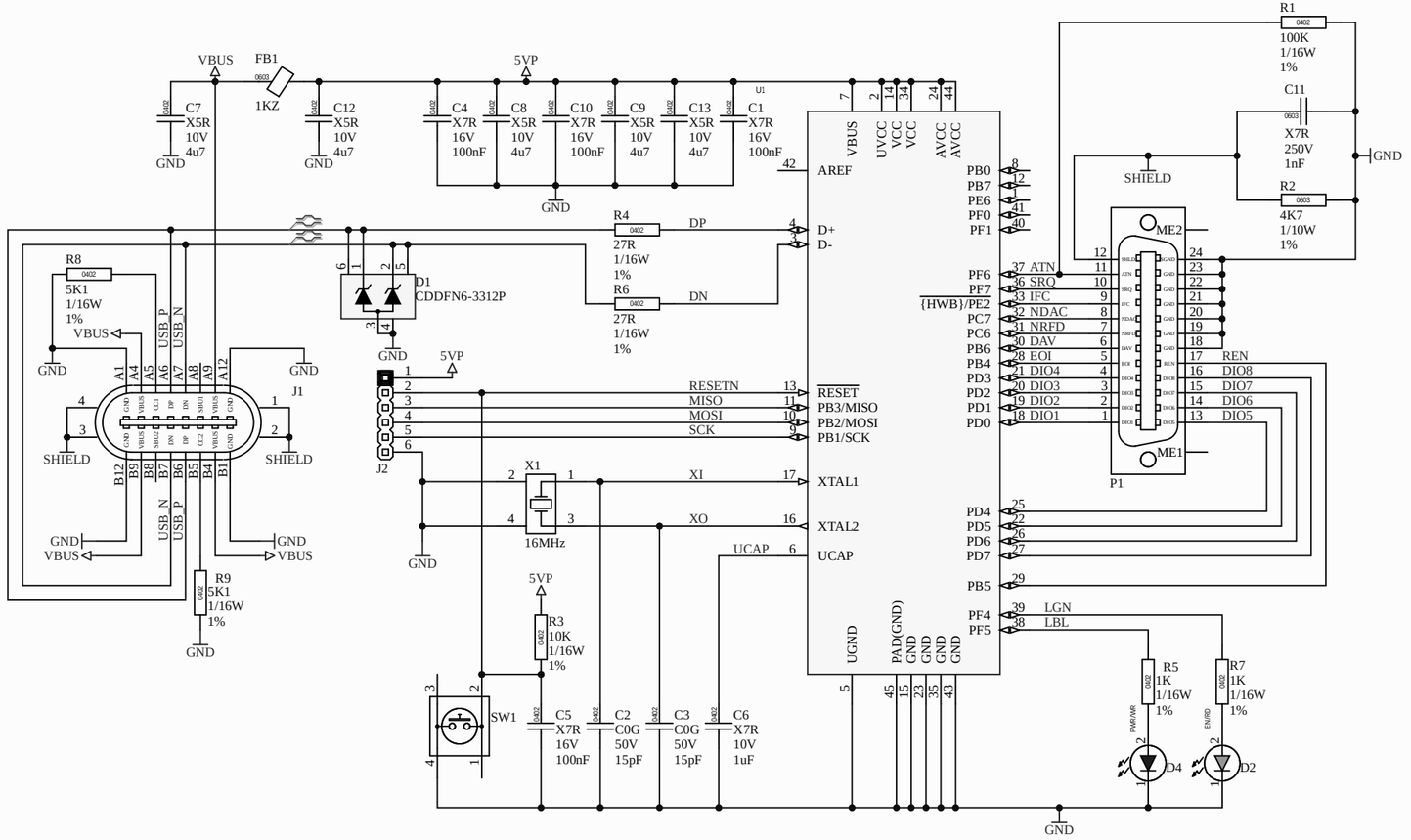




Document Creation Date: 7/1/2025

Design : Vincent Himpe

Fullyrouted



BY SA

BASED ON THE WORK OF :

https://github.com/xyphro/UsbGpib

https://github.com/dazz100/UsbGpib

Modifications by Vincent Himpe

- SWITCHED TO VERTICAL GPIB CONNECTOR
- Board is sized to fit behind connector
- Component footprint changes (QFN,0402)
- Added Ferrite bead
- Reset button added
- Changed TVS diode
- BOM optimized for JLCPCB assembly service (LCSC parts)

GENERAL

GENERAL

1. DO NOT ALTER SUPPLIED COPPER OR DRILL DATA
2. NO COPPER BALANCING OR REMOVAL OF UNUSED PADS ALLOWED.
3. SILKSCREEN MAY BE CLIPPED / TRIMMED TO EXPOSE COPPER
4. PCB DESIGN AND ACCEPTANCE CRITERIA SHALL FOLLOW THE REQUIREMENTS OF IPC-2221, IPC-2222, AND IPC-6012 CLASS 2
5. ALL SPECIFICATIONS SHALL BE THE LATEST STANDARDS, UNLESS OTHERWISE NOTED
6. ALL MODIFICATIONS MUST BE COMMUNICATED AND APPROVED IN WRITING.

MATERIALS

7. MATERIALS SHALL BE ACCORDING TO THE STACKUP DRAWING IN THIS DOCUMENT.
8. MATERIAL SHALL HAVE A FLAMABILITY RATING OF UL 94V-0 OR BETTER
9. SURFACE FINISH : HASL
10. SOLDER MASK COLOR : BLACK
11. SOLDERMASK MAX REGISTRATION ERROR : 0.05mm
12. SILKSCREEN COLOR : WHITE

STACKUP / IMPEDANCE CONTROL

13. THICKNESS LISTED IN LAYER STACK LEGEND REPRESENT FINAL PRESSED VALUES FOR THE PREPREG
14. IMPEDANCE CONTROL, IF ANY, SHALL BE PER LISTED TABLE WITH A MAX TOLERANCE OF +/-10%

QA, ELECTRICAL TEST AND MARKINGS

15. PCB SHALL BE 100% ELECTRICALLY TESTED FOR SHORTS AND CONTINUITY

Fullyrouted

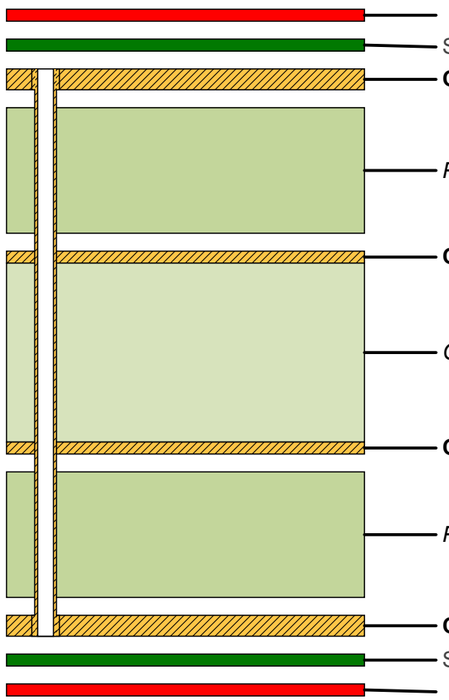
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

LAYER STACK

Layer Stack Legend



Material	Layer	Thickness	Dielectric Material	Type	Gerber	Dk	Weight	Constructions	Df	Resin
	Top Overlay			Legend	GTO					
Surface Material	Top Solder	0.010mm(0.400mil)	Solder Resist	Solder Mask	GTS	3.5				
Copper	**Top Layer**	**0.035mm(1.378mil)**		**Signal**	**GTL**		**1oz**			
Prepreg		*0.210mm(8.284mil)*	*7628 x 1*	*Dielectric*		*4.1*		*1080*	*0.02*	*62%*
CF-004	**Layer 1**	**0.015mm(0.598mil)**		**Signal**	**G1**		**0.5oz**			
Core		*1.065mm(41.929mil)*	*FR-4*	*Dielectric*		*4.8*				
CF-004	**Layer 2**	**0.015mm(0.598mil)**		**Signal**	**G2**		**0.5oz**			
Prepreg		*0.210mm(8.284mil)*	*7628 x 1*	*Dielectric*		*4.1*		*1080*	*0.02*	*62%*
Copper	**Bottom Layer**	**0.035mm(1.378mil)**		**Signal**	**GBL**		**1oz**			
Surface Material	Board Layer Stack Bottom Solder	0.010mm(0.400mil)	Solder Resist	Solder Mask	GBS	3.5				
	Board Layer Stack Bottom Overlay			Legend	GBO					

Total thickness: 1.607mm(63.249mil)

Fullyrouted

Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

CONTROLLED IMPEDANCE

Transmission Line Structure Table

Impedance Id	Transmission Line	Target Impedance	Calculated Impedance	Trace layer	Wide Trace Width	Narrow Trace Width	Reference layers	Substack	Clearance	Target Tolerance
1	Edge-Coupled Coated Microstrip	90	94.37	Top Layer	11.310mil(11.310mil)	8.661mil(8.661mil)	Layer 1	Board Layer Stack	5.906mil(5.906mil)	10%
2	Edge-Coupled Offset Stripline	90	89.97	Layer 1	4.996mil(4.996mil)	4.996mil(4.996mil)	Top Layer,Layer 2	Board Layer Stack	0.000mil(0.000mil)	10%
3	Edge-Coupled Coated Microstrip	90	94.37	Bottom Layer	11.310mil(11.310mil)	8.661mil(8.661mil)	Layer 2	Board Layer Stack	5.906mil(5.906mil)	10%

Fullyrouted

Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

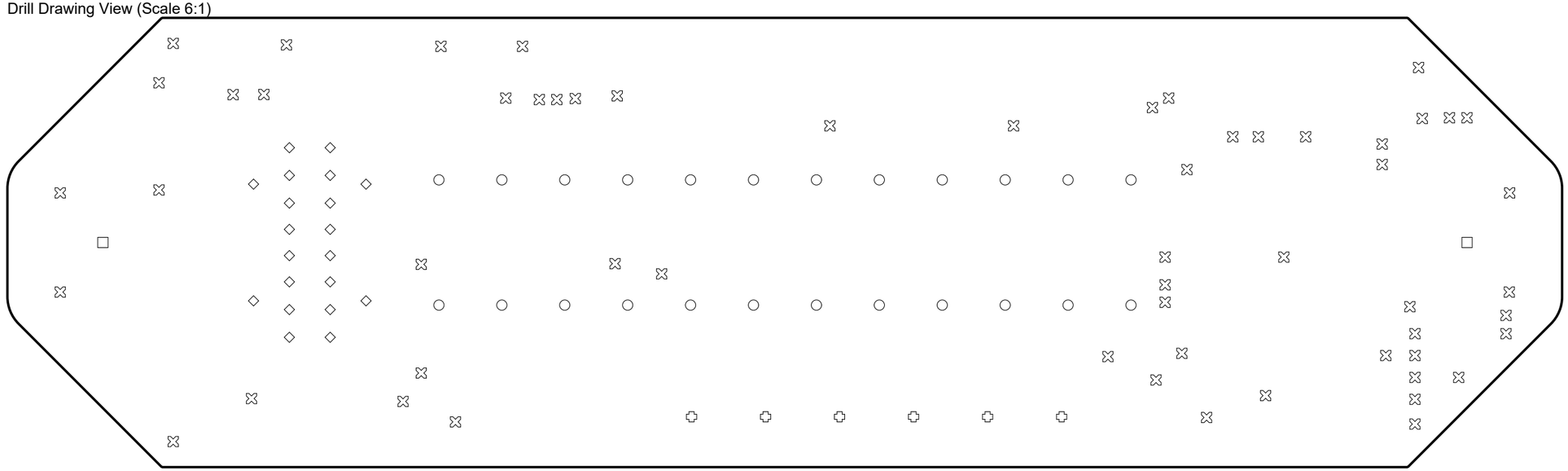
DRILL LEGEND

Drill Table

Symbol	Count	Hole Size	Plated	Hole Type	Drill Layer Pair	Via / Pad	Pad Shape	Description	Hole Tolerance	Via Type	Via Feature
⊠	58	0.300mm(11.811mil)	Plated	Round	Top Layer - Bottom Layer	Via					
◇	20	0.500mm(19.685mil)	Plated	(Mixed)	Top Layer - Bottom Layer	Pad	Rounded				
○	24	1.000mm(39.370mil)	Plated	Round	Top Layer - Bottom Layer	Pad	Rounded				
✣	6	1.100mm(43.307mil)	Plated	Round	Top Layer - Bottom Layer	Pad	(Mixed)				
□	2	3.300mm(129.921mil)	Non-Plated	Round	Top Layer - Bottom Layer	Pad	Rounded				
	110 Total										

DRILL DRAWING

Drill Drawing View (Scale 6:1)



Fullyrouted

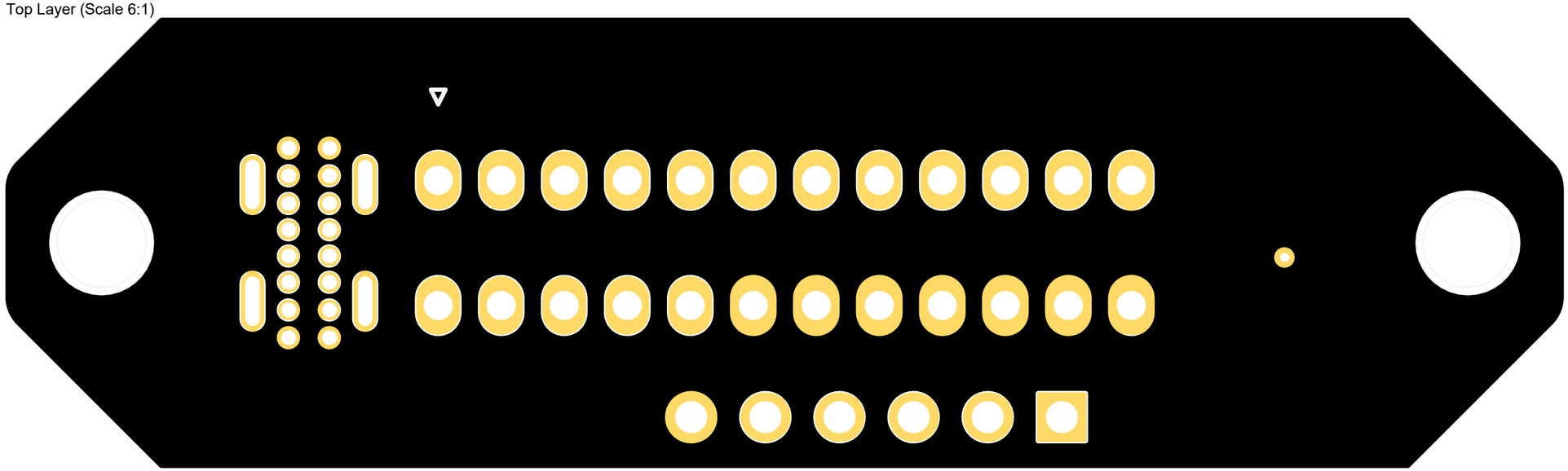
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

COMPOSITE VIEW FRONT

Top Layer (Scale 6:1)



Fullyrouted

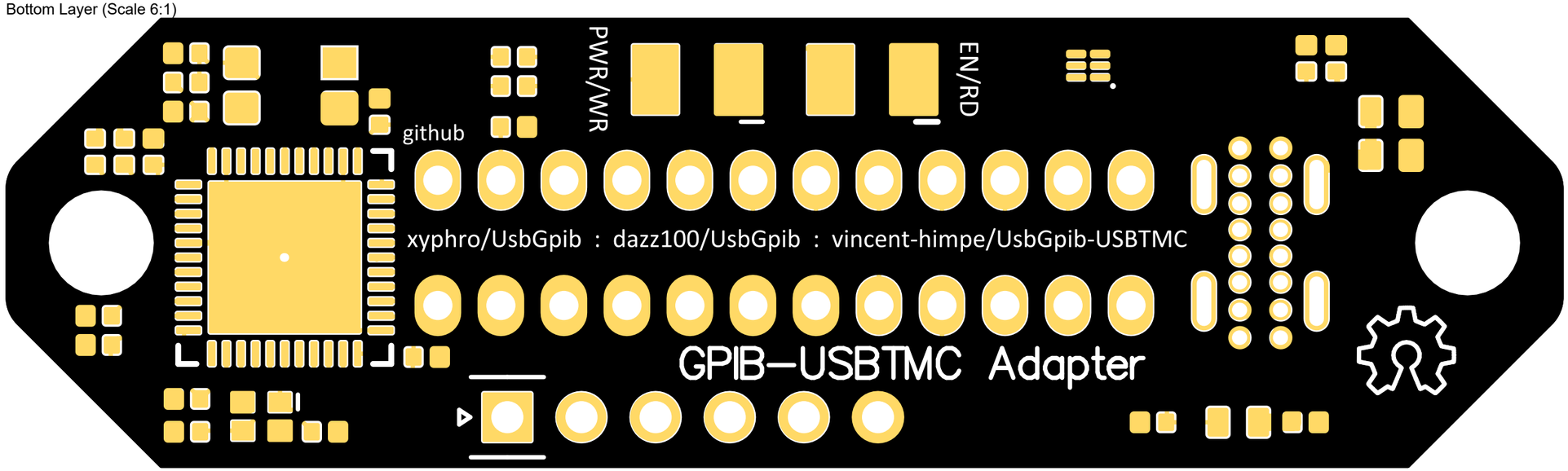
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

COMPOSITE VIEW BACK

Bottom Layer (Scale 6:1)



Fullyrouted

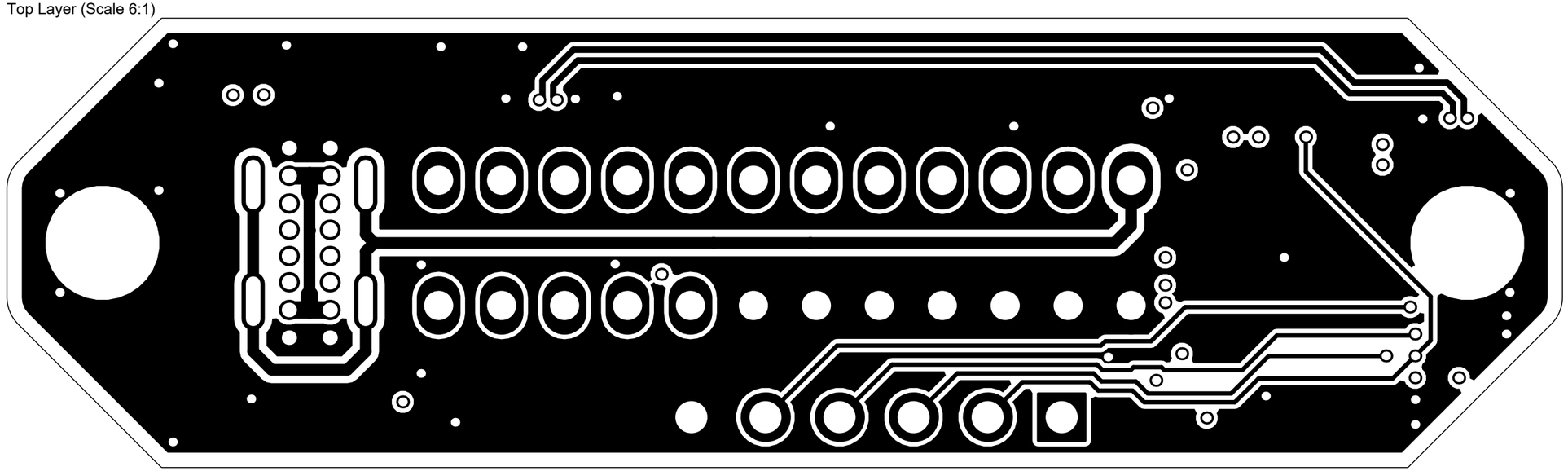
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

LAYER VIEW : TOP LAYER

Top Layer (Scale 6:1)



Fullyrouted

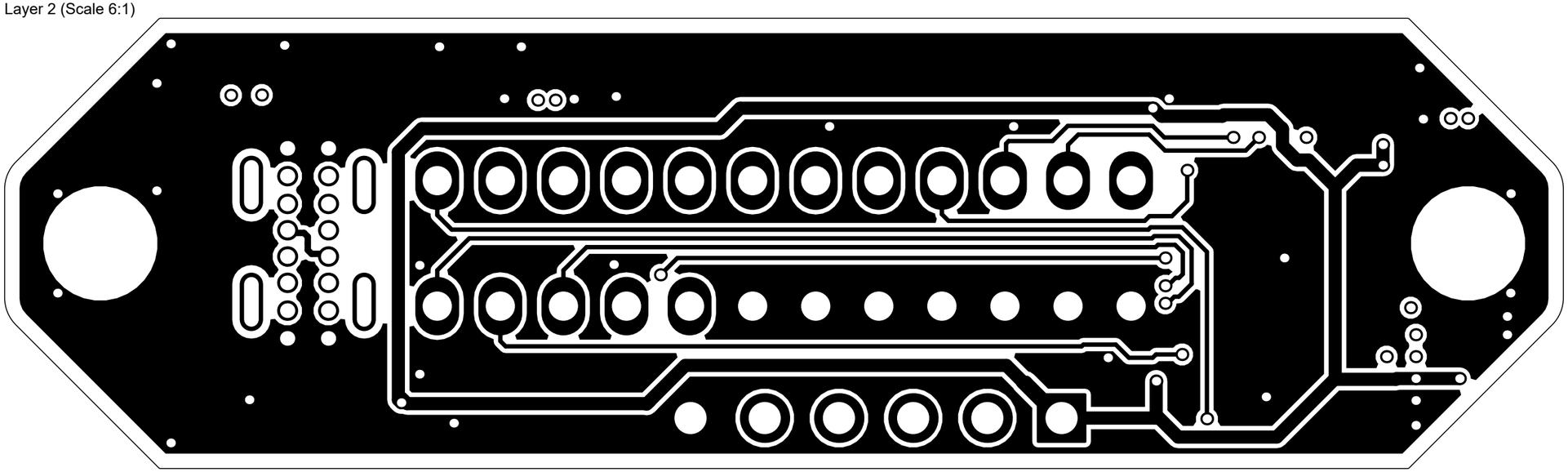
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

LAYER VIEW : MID LAYER 1

Layer 2 (Scale 6:1)



Fullyrouted

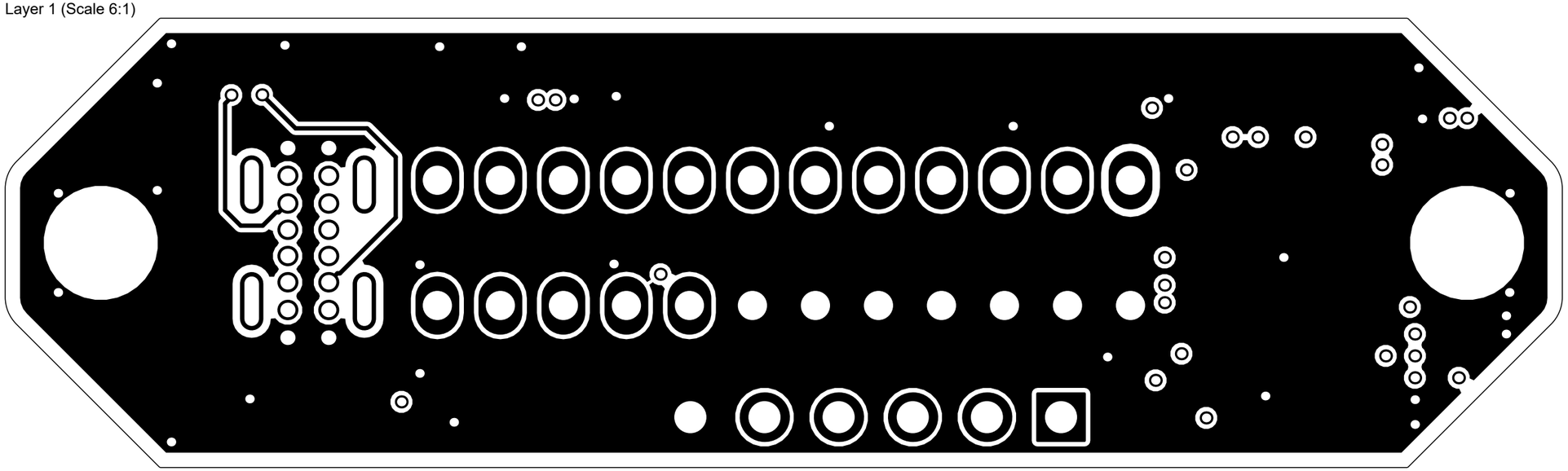
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

LAYER VIEW : MID LAYER 2

Layer 1 (Scale 6:1)



Fullyrouted

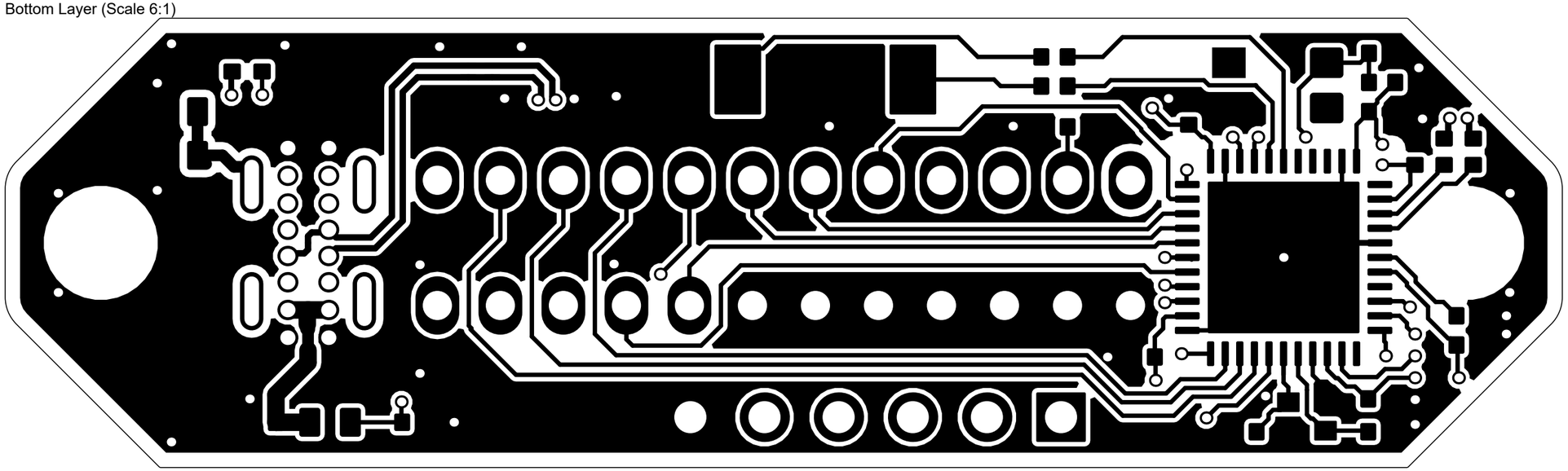
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

LAYER VIEW : BOTTOM LAYER

Bottom Layer (Scale 6:1)



Fullyrouted

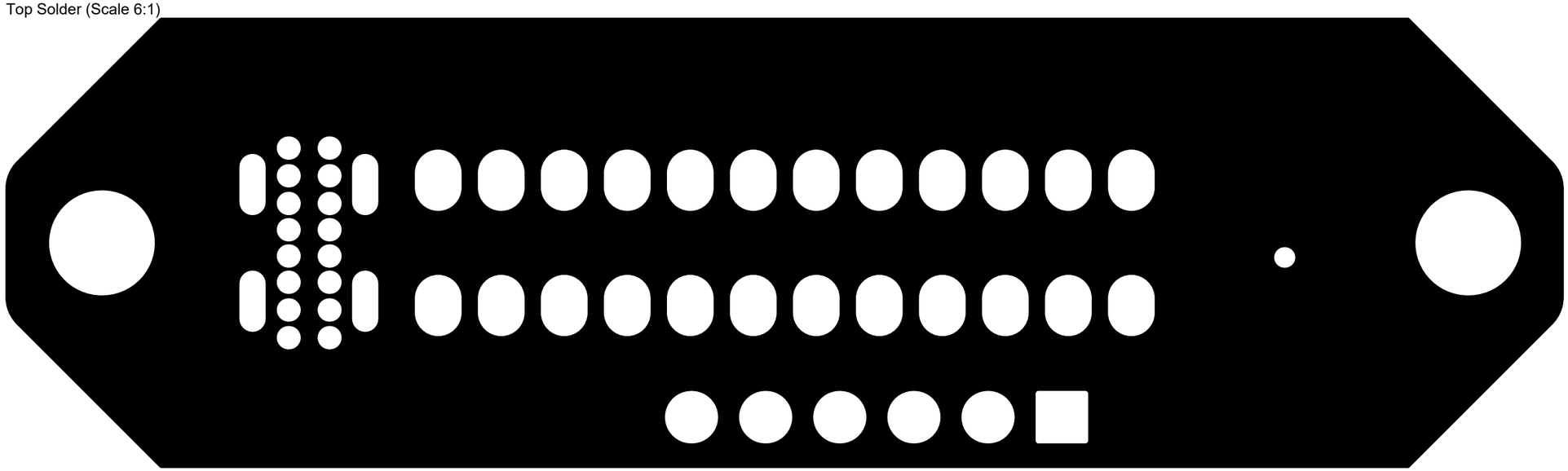
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

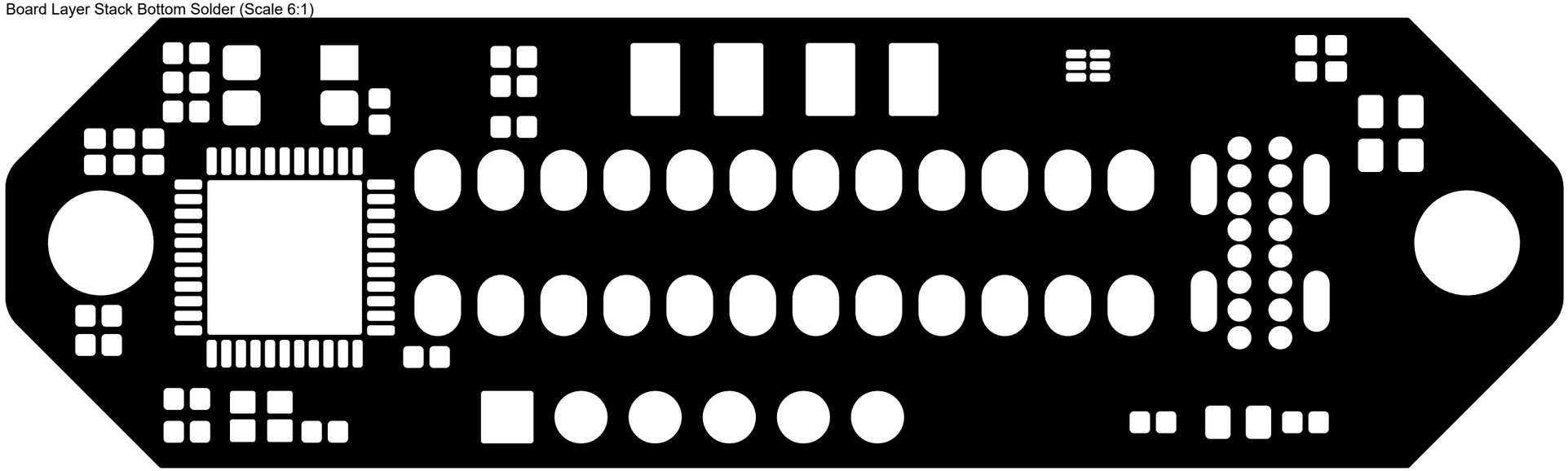
LAYER VIEW : TOP SOLDER MASK

Top Solder (Scale 6:1)



LAYER VIEW : BOTTOM SOLDER MASK

Board Layer Stack Bottom Solder (Scale 6:1)



Fullyrouted

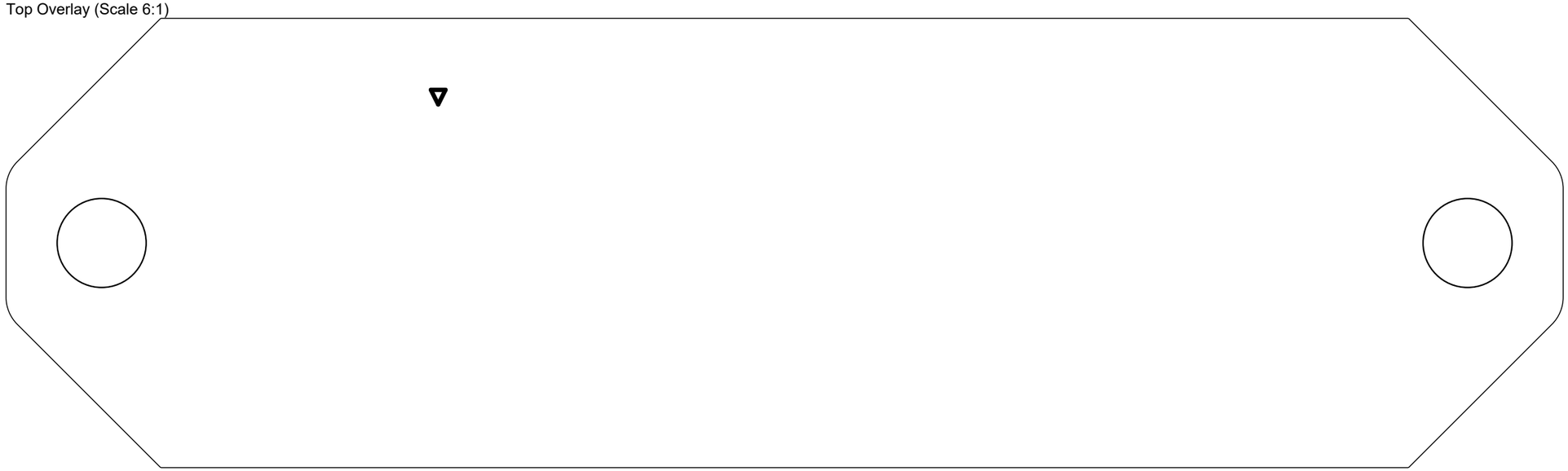
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

LAYER VIEW : TOP SILKSCREEN (LEGEND)

Top Overlay (Scale 6:1)



Fullyrouted

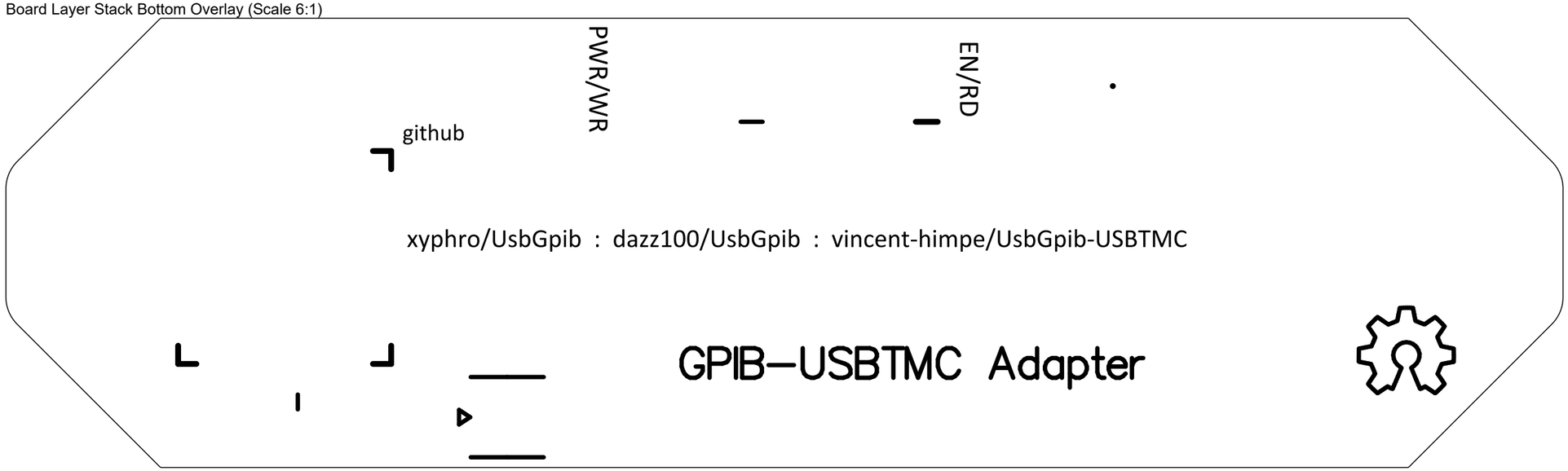
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

LAYER VIEW : BOTTOM SILKSCREEN (LEGEND)

Board Layer Stack Bottom Overlay (Scale 6:1)



Fullyrouted

Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

FABRICATION DRAWING

GENERAL

Unless otherwise specified the following rules apply:

1. DO NOT DEVIATE FROM ARTWORK OR BOM WITHOUT PRIOR AUTHORIZATION.
2. ASSEMBLE AND INSPECT PER IPC-610 CLASS 2

Bill of Materials and Material Handling

3. THE BOM CONTAINED IN THIS DOCUMENT IS AS-BUILT. NON-INSTALLED PARTS HAVE BEEN REMOVED. ADDITIONAL BOM FORMATS ARE AVAILABLE IN THE PROJECT FILES
4. ANY PART SUBSTITUTIONS MUST BE APPROVED IN WRITING BEFORE ASSEMBLY
5. ALL MATERIALS MUST BE PROCURED FROM MANUFACTURER AUTHORIZED DISTRIBUTORS OR THE ORIGINAL MANUFACTURER
6. ALL COMPONENTS AND BOARDS TO BE HANDLED AND STORED ACCORDING TO IPC GUIDELINES
7. ESD CONTROL PER IPC RULES

Soldering

8. SOLDERING TO BE DONE USING SN37PB63 ALLOY USING ALLOY MANUFACTURER RECOMMENDED NO-CLEAN FLUX
9. BGA COMPONENTS WITH LEAD-FREE CONNECTIONS NEED TO BE REBALLED WITH SN63PB37. MIXING OF ALLOYS IS NOT PERMITTED.
10. SOLDERING PREFERRABLY TO BE DONE USING NITROGEN ATMOSPHERE
11. SURPLUS COMPONENTS TO VACUUM SEALED WITH DESSICANT IN ANTISTATIC BAGS
12. INCOMING MATERIAL (BOARDS AND COMPONENTS) NEEDS TO BE INSPECTED FOR HUMIDITY AND BAKED IF NEEDED PRIOR TO USE.
13. MANUAL REWORK / TOUCHUP TO BE DONE USING SAME ALLOY AND APPROPRIATE FLUX. FLUX MUST BE REMOVED.

Fullyrouted

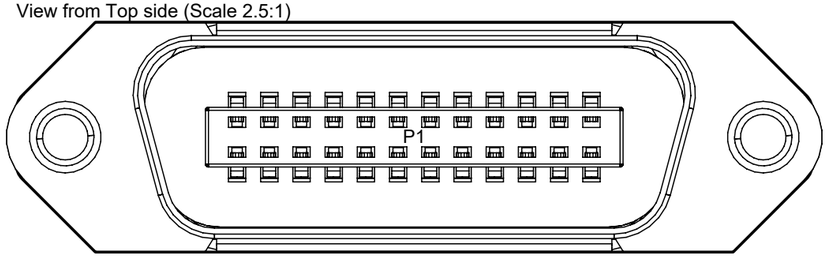
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

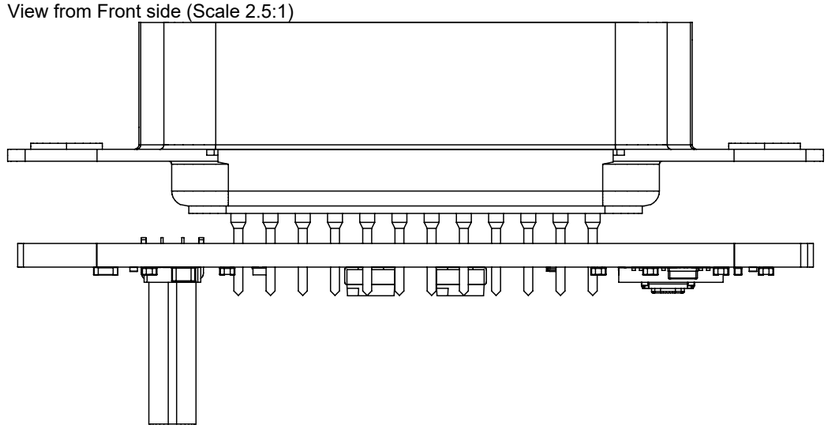
ASSEMBLY DRAWING

2D VIEW

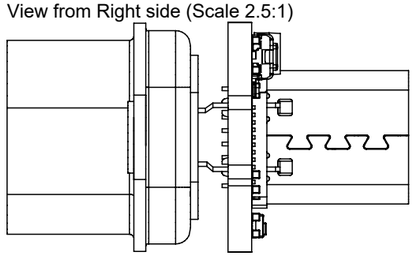
View from Top side (Scale 2.5:1)



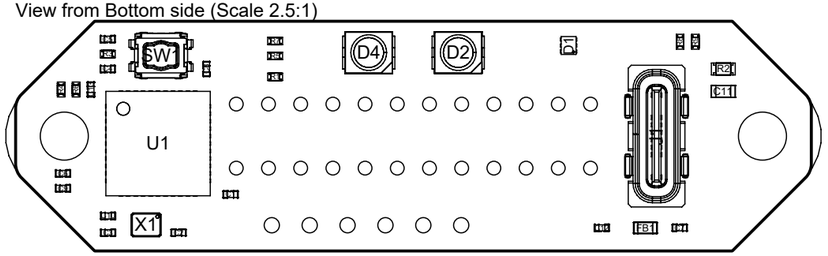
View from Front side (Scale 2.5:1)



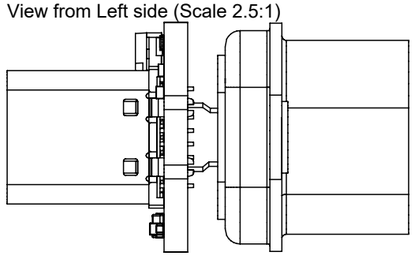
View from Right side (Scale 2.5:1)



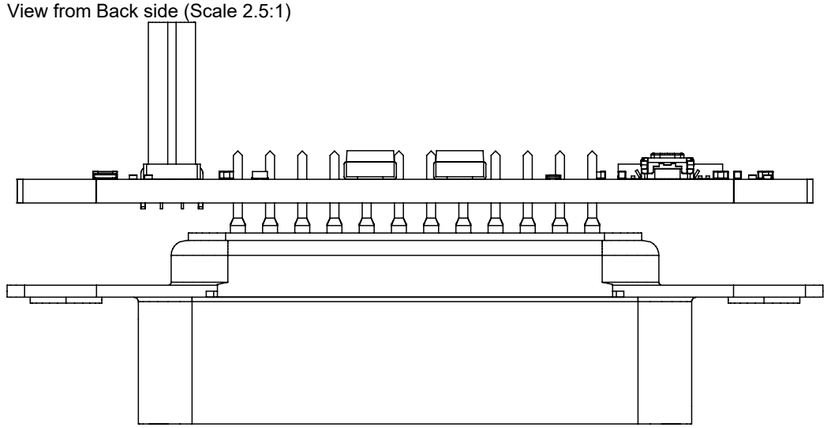
View from Bottom side (Scale 2.5:1)



View from Left side (Scale 2.5:1)



View from Back side (Scale 2.5:1)



Fullyrouted

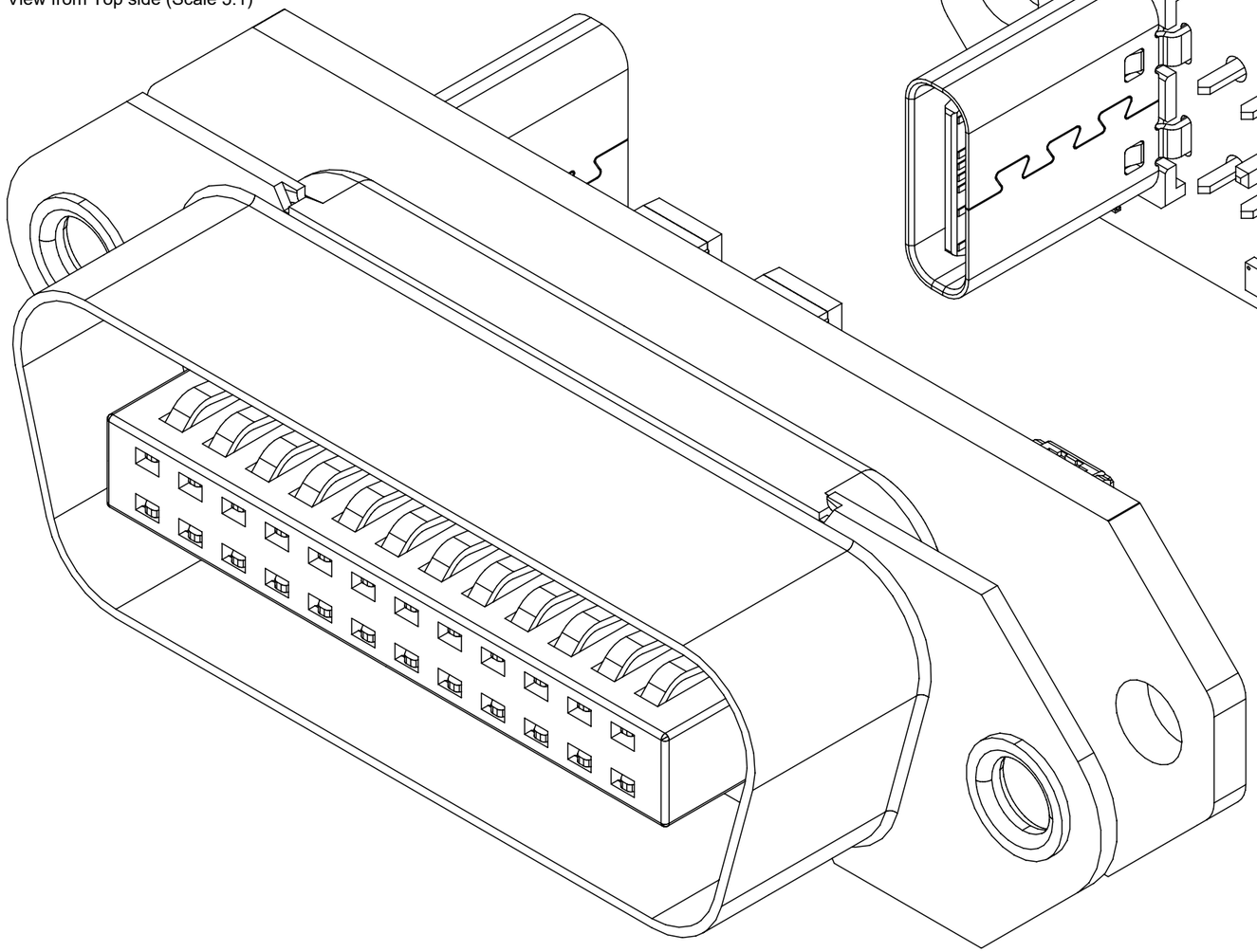
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

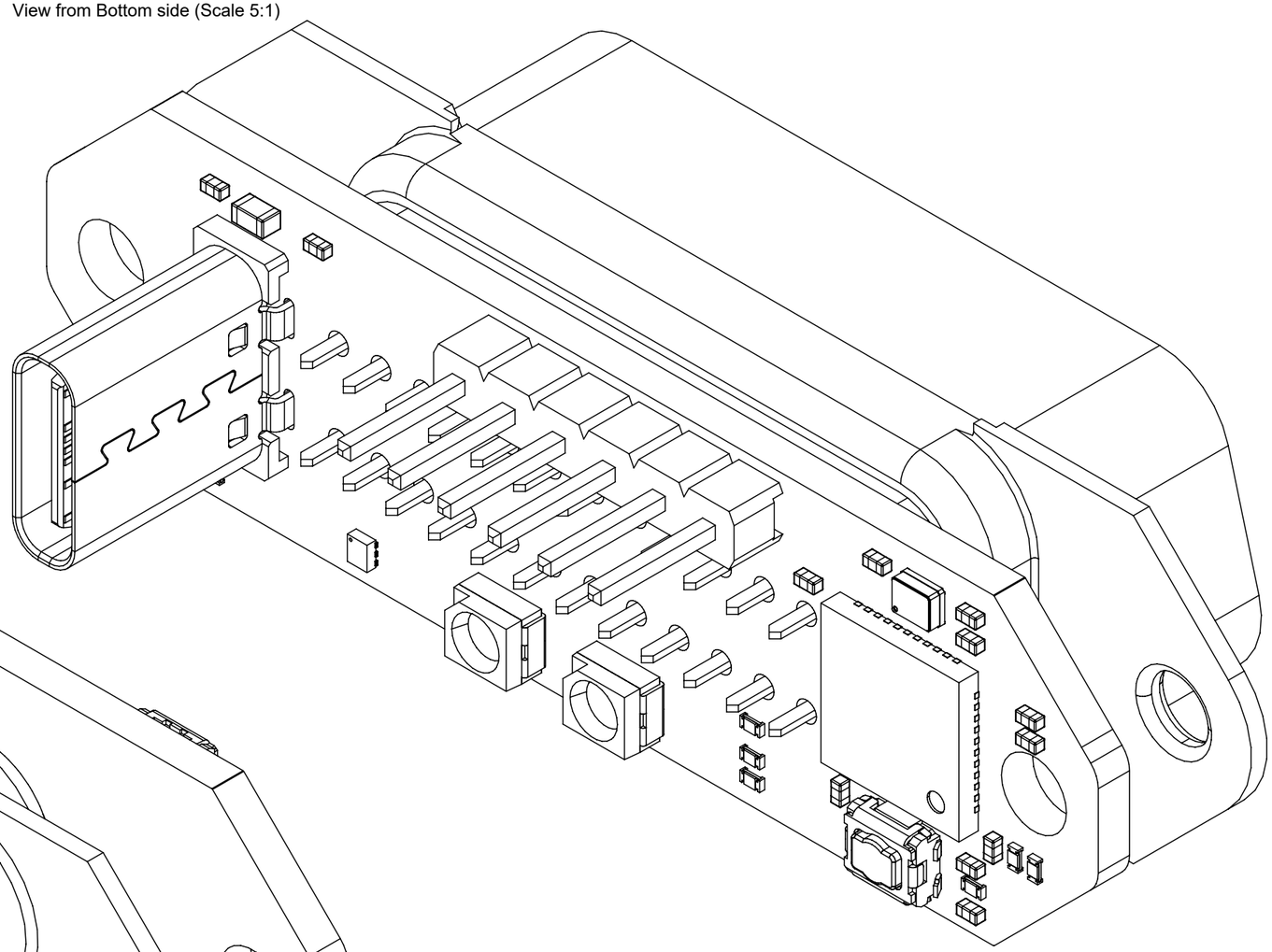
ASSEMBLY DRAWING

3D VIEW

View from Top side (Scale 5:1)



View from Bottom side (Scale 5:1)



Fullyrouted

Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

ASSEMBLY DRAWING

Bill Of Materials

Quantity	Designator	Description	LCSC
4	C1, C4, C5, C10	CAPACITOR,CERAMIC,100nF,16V,X7R,0402	C60474
2	C2, C3	CAPACITOR,CERAMIC,15pF,50V,C0G,0402	C3906764
1	C6	CAPACITOR,CERAMIC,1uF,10V,X7R,0402	C528974
5	C7, C8, C9, C12, C13	CAPACITOR,CERAMIC,4u7,10V,X5R,0402	C23733
1	C11	CAPACITOR,CERAMIC,1nF,250V,X7R,0603	C277510
1	D1	TVS,USB,BOURNS,CDDFN6-3312P	C3700524
1	D2	LED,GREEN,PLCC2	C5248446
1	D4	LED,BLUE,PLCC2	C6323026
1	FB1	FERRITE,1KZ@100MHz,0R2DC,0603	C160982
1	J1	CONN,USB-C,VERTICAL,TH	
1	J2	CONN,PINHEADER,1X6,2.45MM,VERT,GOLD	
1	P1	CONN,GPIB,24P,VERT,TH	
1	R1	RESISTOR,100K,1%,63mW,0402 (1005)	C60491
1	R2	RESISTOR,4K7,1%,100mW,0603 (1608)	C99782
1	R3	RESISTOR,10K,1%,63mW,0402 (1005)	C60490
2	R4, R6	RESISTOR,27R,1%,63mW,0402 (1005)	C138021
2	R5, R7	RESISTOR,1K,1%,63mW,0402 (1005)	C106235
2	R8, R9	RESISTOR,5K1,1%,63mW,0402 (1005)	C105872
1	SW1	SW,SMD,TACT,4PIN,2.9X3.5,4PIN	C483888
1	U1	IC,CPU,ATMEG32U4-MU,QFN44	C45874
1	X1	XTAL,16MHz,2016,4P	C2965579

Fullyrouted

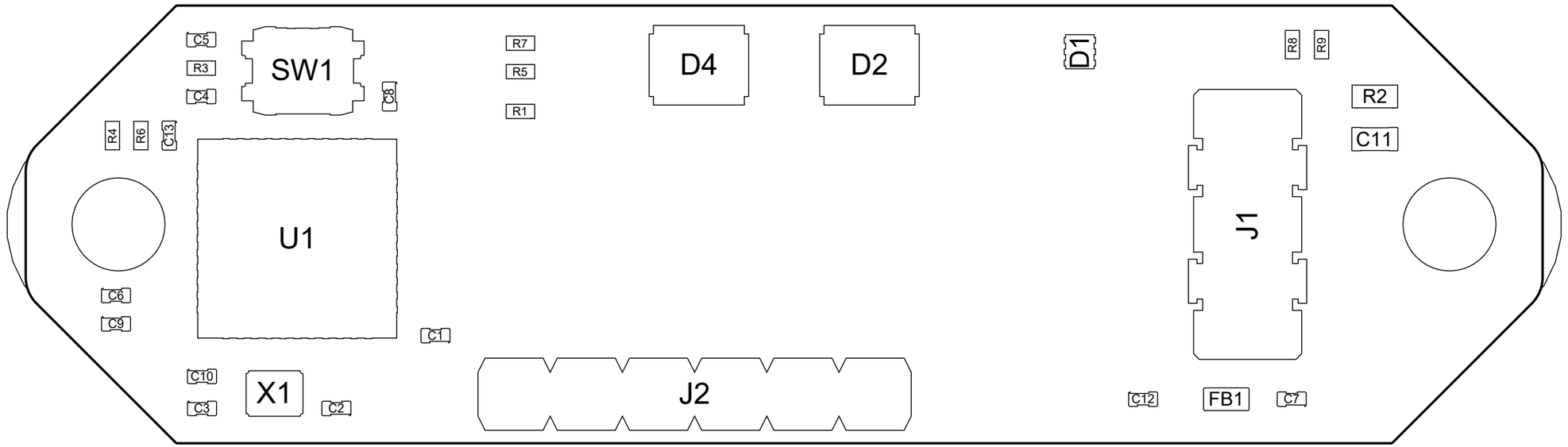
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

ASSEMBLY DRAWING

DESIGNATORS BACK

View from Bottom side (Scale 6:1)



Fullyrouted

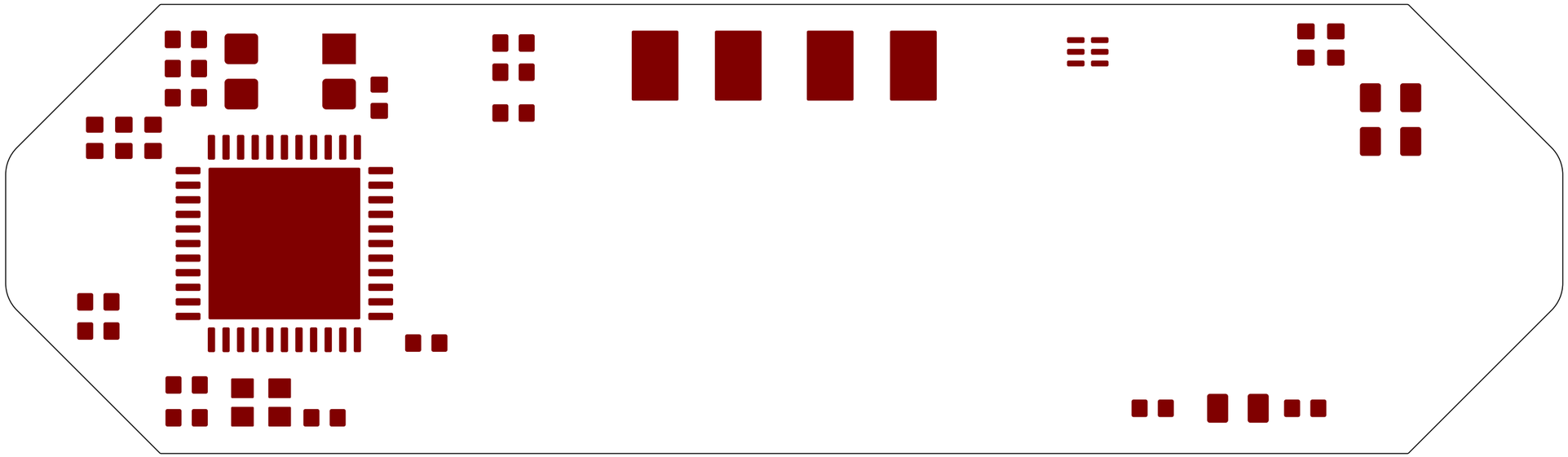
Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

ASSEMBLY DRAWING

PASTE MASK BOTTOM

Bottom Paste (Scale 6:1)



Fullyrouted

Project USBgpib-USBTMC-V3mini.PrjPcb

Version: 3Mini | Variant [No Variations]

ASSEMBLY DRAWING