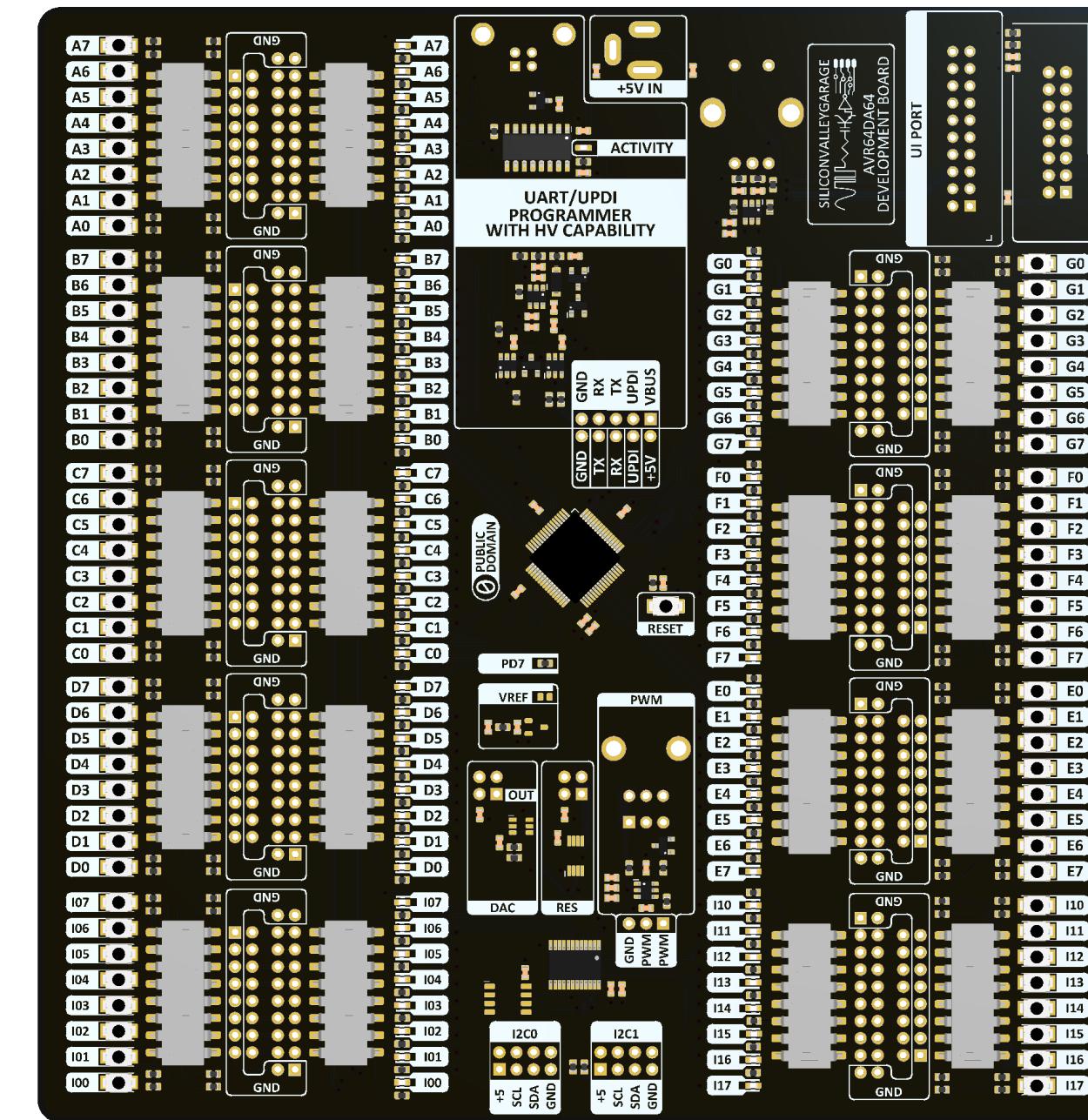


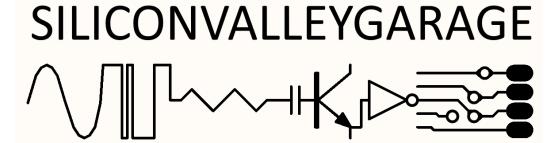
# AVR64DA64-BREAKOUT.PpjPcb

Realistic View



Document Creation Date: 9/23/2025

Design : Vincent Himpe



Breakout Board for AVR64Dx64 processor. Both DA and DB can be used.

BOM and Pick and Place is optimized for fabrication/assembly at JLCPCB. All thru-hole and non-basic components are omitted as those are too expensive to have installed. The exception is the UPDI interface and of course the processor itself. You may have to switch that manually in during project order between a DA and DB version depending on what is in stock

A The PWM , 2.0248V reference, I2C DAC , Digital Potentiometer and FRAM are optional.

UPDI programmer : This implements a HV capable UPDI programmer RTS serves as the trigger for the HV pulse. This is compatible with most UPDI software out there.

THe DTR pin switches between UPDI and UART mode. When in UPDI mode the USB-Serial converter is connected to UART0.

J5 allows you to completely disconnect the programmer from the board. You can bridge all the signals or only some of the signals.

When the reference source for 2.048 Volt is in use, install R46 and remove R47. ( move the resistor between locations. )

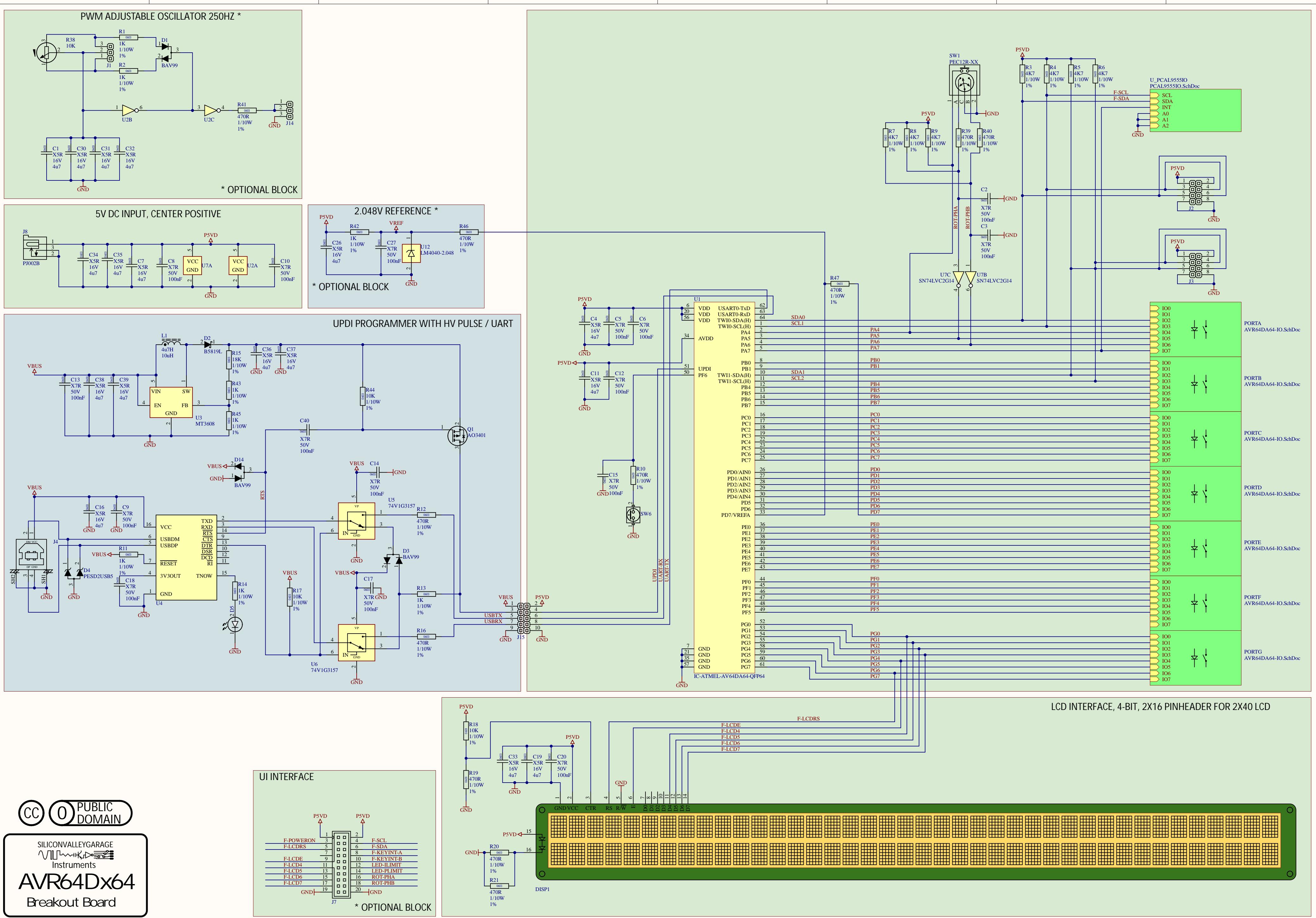
THe UI interface connector may not serve a purpose for general use. This is something custom for UI systems i use.

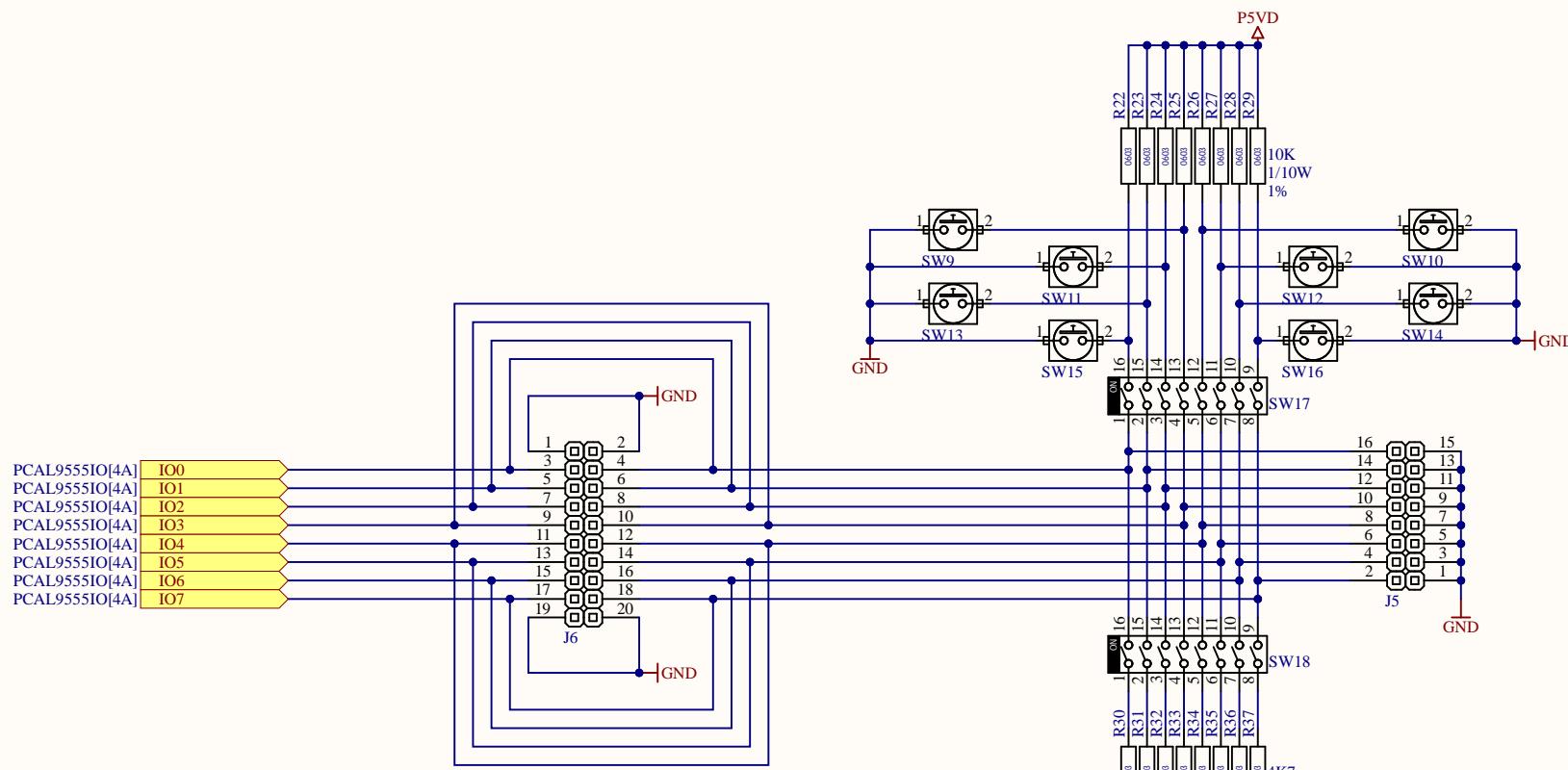
The LCD interface uses a standard 2x8 pinheader that mates with most 2x40 and some other displays with that pinout.

There is an extra bank of I/O pins on the I2C bus 0 behind a PCAL9555. You can use a PCA9555 as well, they are pin compatible. The L variant has extra I/O configuration registers as well as event-trapping ability.

Ever I/O bank has a LED and a button attached. You can enable/disable these with the adjacent dip-switches.

You can use either a 24Cxx EEprom or an FRAM device. They are pin and address compatible. The DAC requires the 2.048 volt reference generator to be installed. You do NOT need to connect the reference to the processor. It has its internal VREF, but you could optionally use the external one, or measure it using the built-in ADC of the processor.





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 Instruments

# AVR64Dx64

## Breakout Board

A

A

B

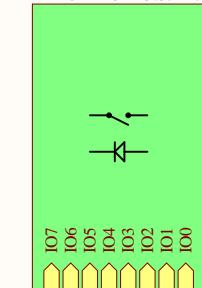
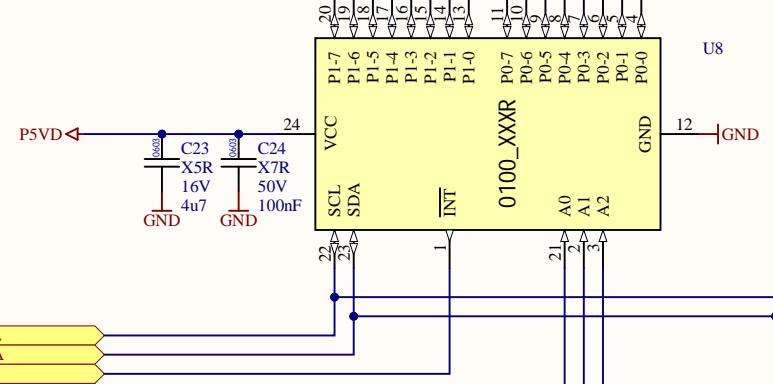
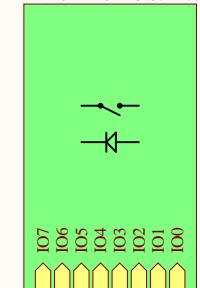
B

C

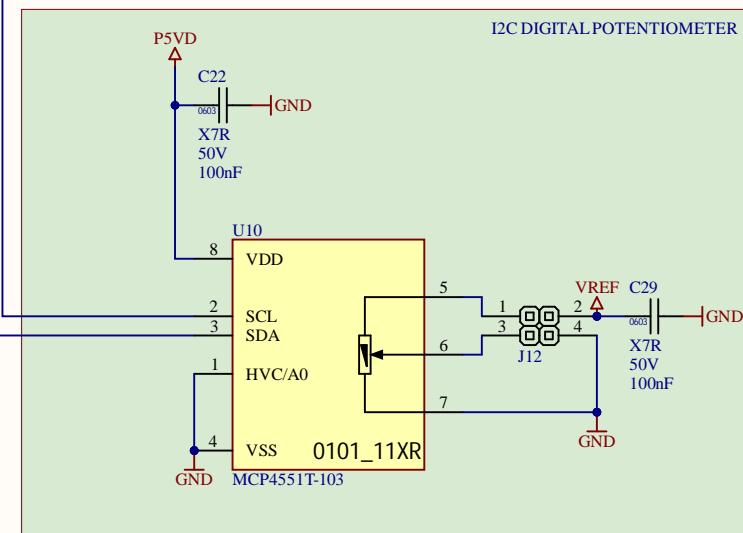
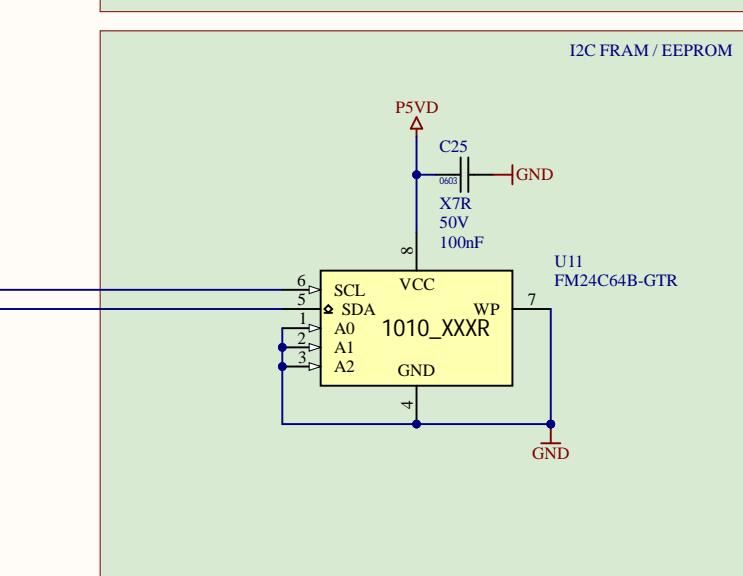
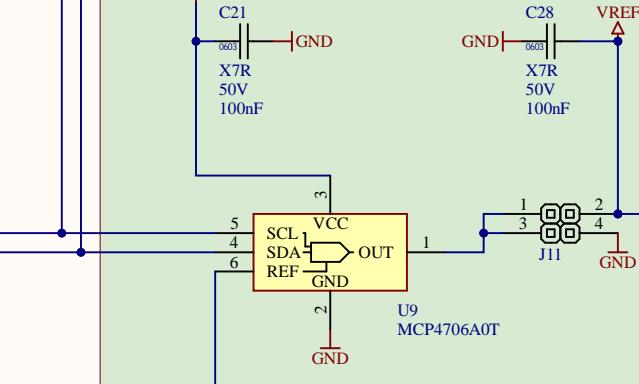
C

D

D

PCAL1  
AVR64DA64-IO.SchDocPCAL0  
AVR64DA64-IO.SchDoc

AVR64DA64-BREAKOUT[7A]  
AVR64DA64-BREAKOUT[7A]  
AVR64DA64-BREAKOUT[7A]  
AVR64DA64-BREAKOUT[7A]  
AVR64DA64-BREAKOUT[7A]  
AVR64DA64-BREAKOUT[7A]

SCL  
SDA  
INT  
A0  
A1  
A2SCL  
SDA  
INT  
A0  
A1  
A2

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**AVR64Dx64**  
Breakout Board

# 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

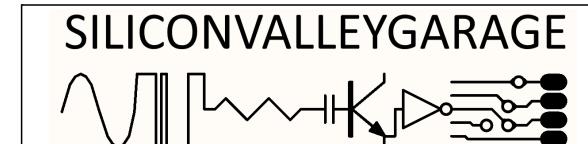
7. MATERIALS SHALL BE ACCORDING TO THE STACKUP DRAWING IN THIS DOCUMENT.
8. MATERIAL SHALL HAVE A FLAMABILITY RATING OF UL 94V-0 OR BETTER
9. SURFACE FINISH : HASL
10. SOLDER MASK COLOR : BLACK
11. SOLDERMASK MAX REGISTRATION ERROR : 0.05mm
12. SILKSCREEN COLOR : WHITE

## 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

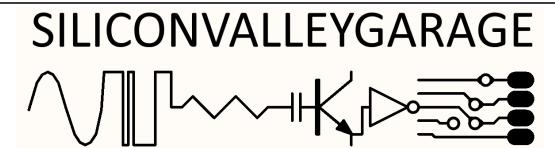


Project AVR64DA64-BREAKOUT.PjPcb  
Version: | Variant AVR64DA64-BREAKOUT-JLCPCB  
FABRICATION DRAWING

# LAYER STACK

## Layer Stack Legend

	Material	Layer	Thickness	Dielectric Material Type	Gerber Dk	Weight	Constructions	Df Resin
A		Top Overlay		Legend	GTO			
B	Surface Material	Top Solder	0.010mm(0.400mil)	Solder Resist	Solder Mask	GTS	3.5	
C	<b>Copper</b>	<b>Top Layer</b>	<b>0.036mm(1.400mil)</b>		Signal	<b>GTL</b>	<b>1oz</b>	
D				1.520mm(59.843mil) FR-4	Dielectric		4.8	
E								
F	<b>Copper</b>	<b>Bottom Layer</b>	<b>0.036mm(1.400mil)</b>		Signal	<b>GBL</b>	<b>1oz</b>	
G	Surface Material	Bottom Solder	0.010mm(0.400mil)	Solder Resist	Solder Mask	GBS	3.5	
H		Bottom Overlay		Legend	GBO			
	Total thickness: 1.611mm(63.443mil)							

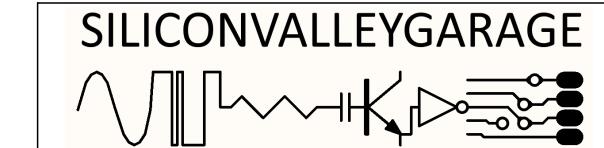


**Project AVR64DA64-BREAKOUT.PjPcb**  
Version: | Variant AVR64DA64-BREAKOUT-JLCPCB  
**FABRICATION DRAWING**

# 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
◇	177	0.500mm(19.685mil)	Plated	Round	Top Layer - Bottom Layer	Via				Type 1B	Tenting Both
⊗	4	0.920mm(36.221mil)	Plated	Round	Top Layer - Bottom Layer	Pad	(Mixed)				
□	408	1.000mm(39.370mil)	Plated	(Mixed)	Top Layer - Bottom Layer	Pad	(Mixed)				
☒	3	1.100mm(43.307mil)	Plated	Round	Top Layer - Bottom Layer	Pad	Rounded				
▽	2	2.300mm(90.551mil)	Non-Plated	Round	Top Layer - Bottom Layer	Pad	Rounded				
○	2	2.300mm(90.551mil)	Plated	Round	Top Layer - Bottom Layer	Pad	Rounded				
⊗	2	2.600mm(102.362mil)	Plated	Round	Top Layer - Bottom Layer	Pad	Rounded				
598 Total											



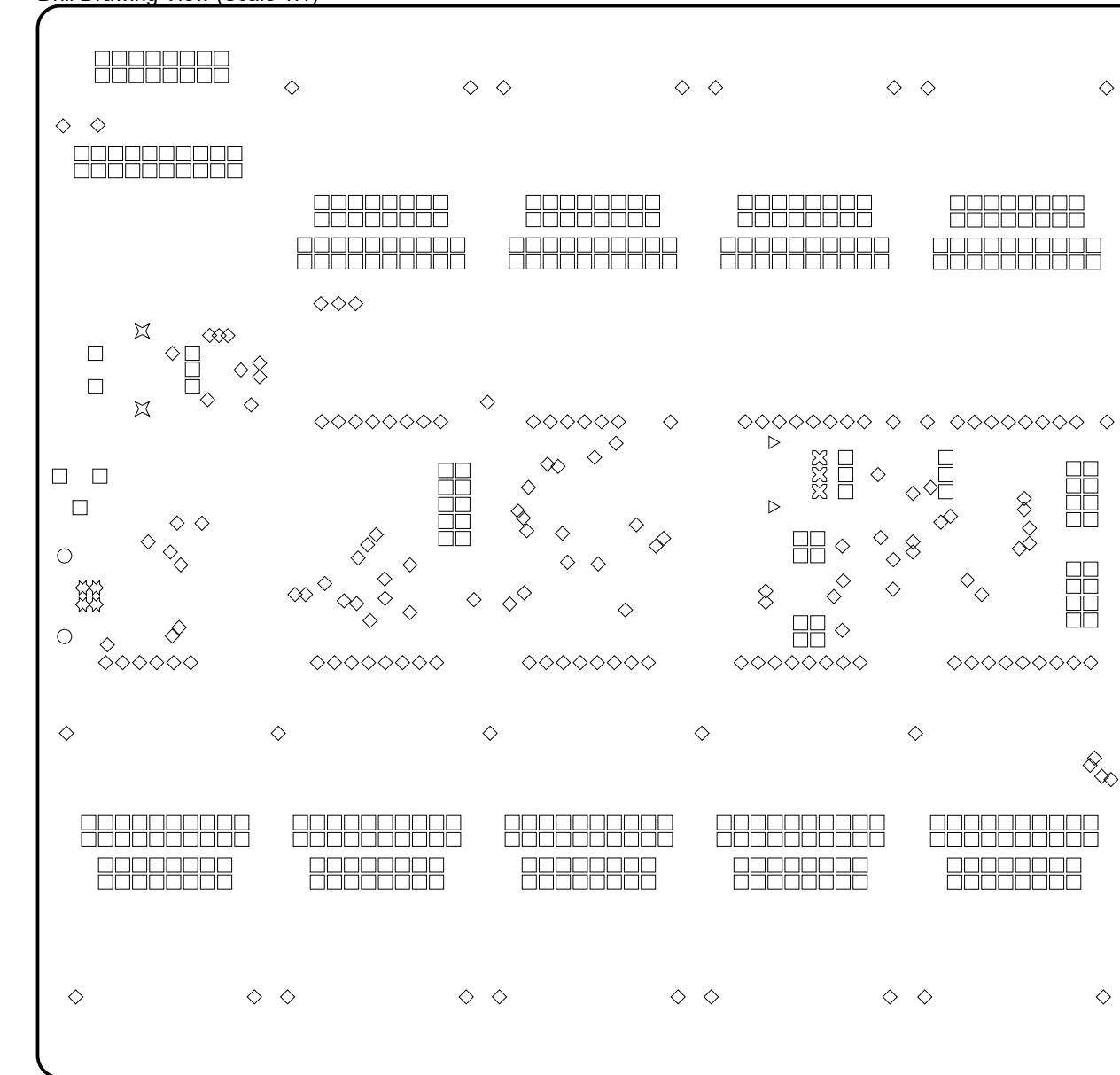
**Project AVR64DA64-BREAKOUT.PjPcb**  
Version: | Variant AVR64DA64-BREAKOUT-JLCPCB  
**FABRICATION DRAWING**

# DRILL DRAWING

A

A

Drill Drawing View (Scale 1:1)



B

B

C

C

D

D

# COMPOSITE VIEW FRONT

A

A

B

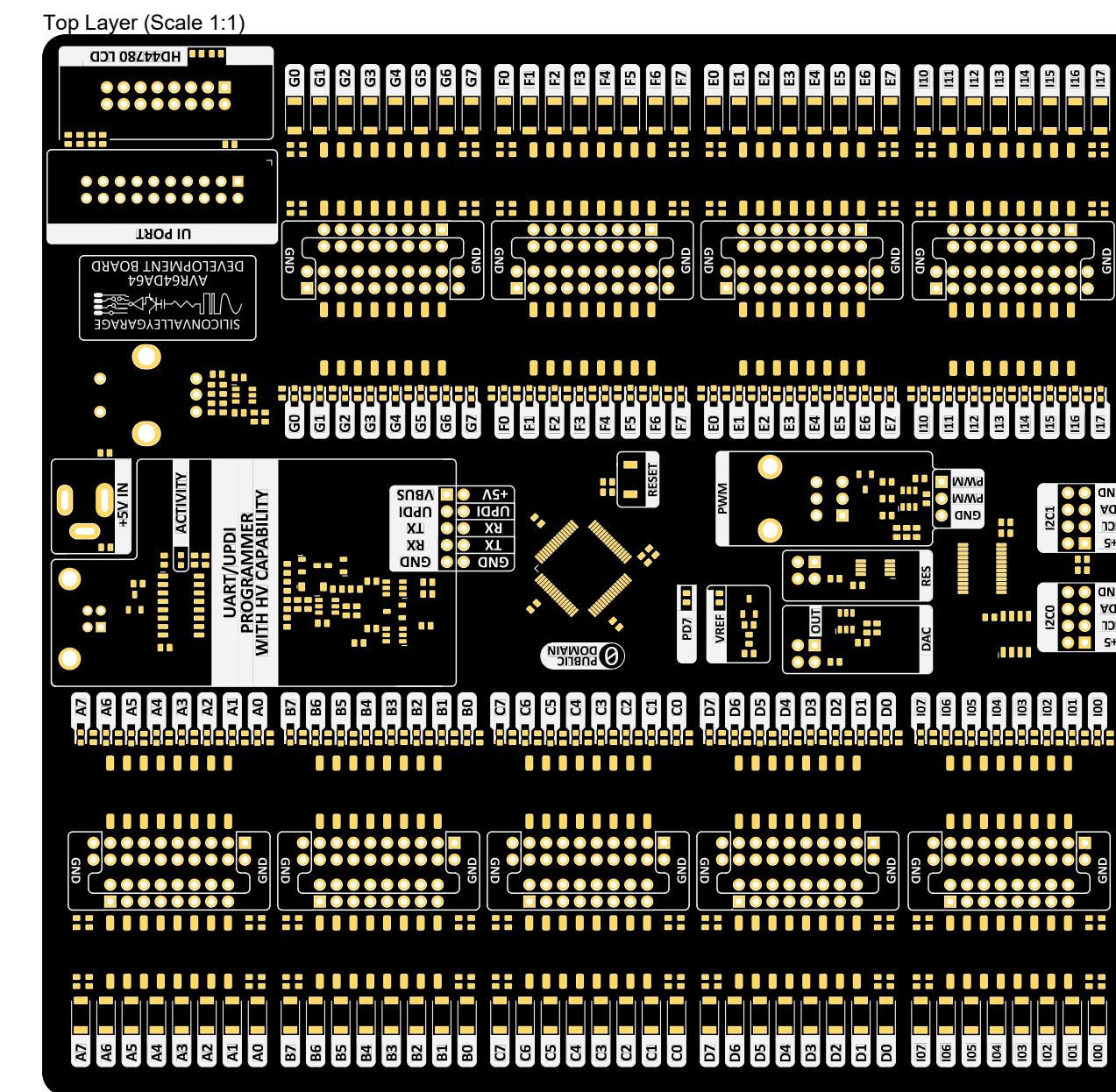
B

C

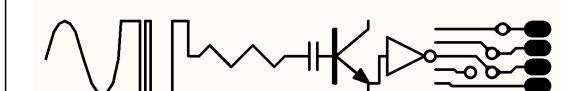
C

D

D



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Project AVR64DA64-BREAKOUT.PjPcb

Version: | Variant AVR64DA64-BREAKOUT-JLCPCB

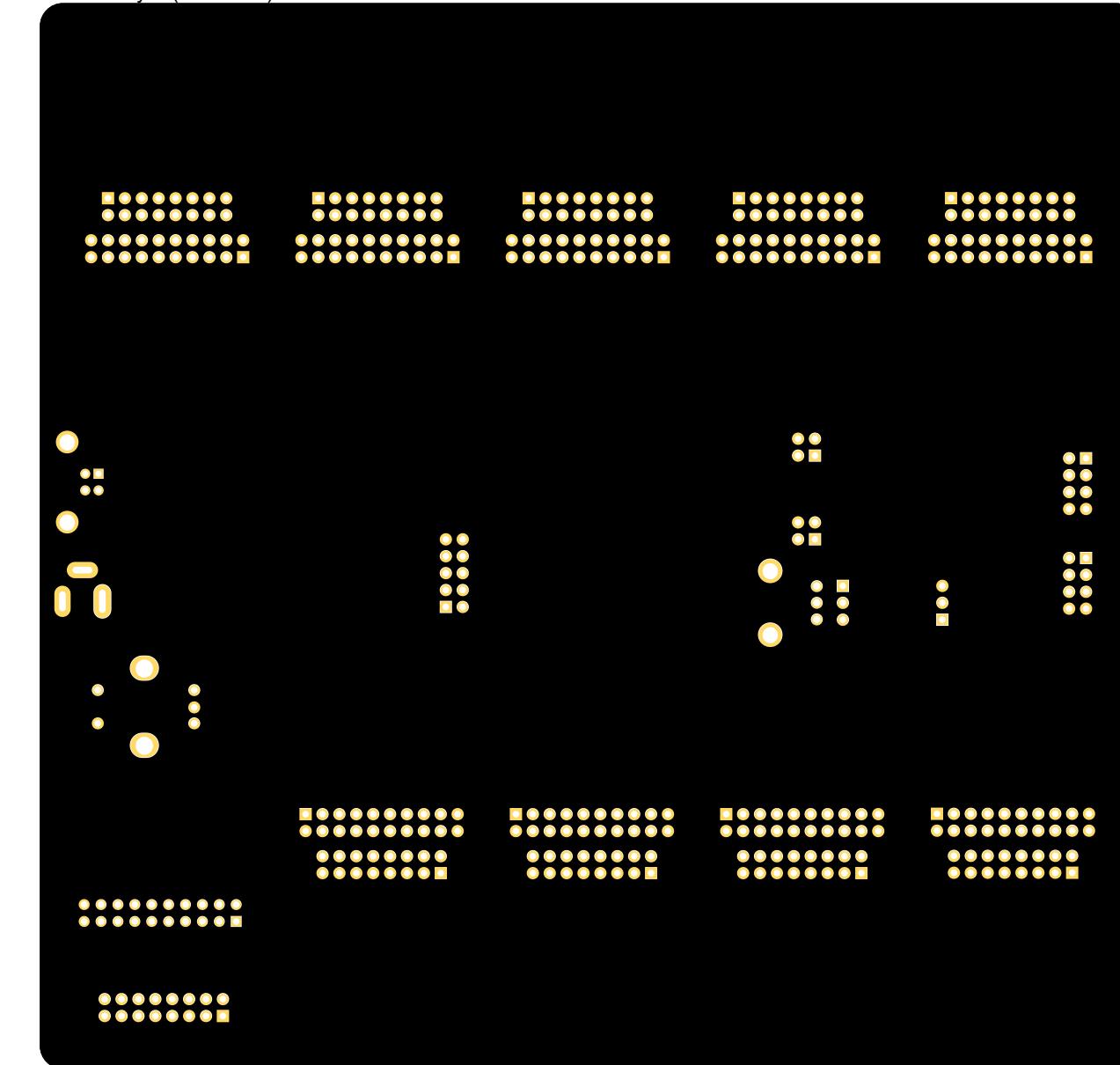
FABRICATION DRAWING

## COMPOSITE VIEW BACK

A

A

Bottom Layer (Scale 1:1)



B

B

C

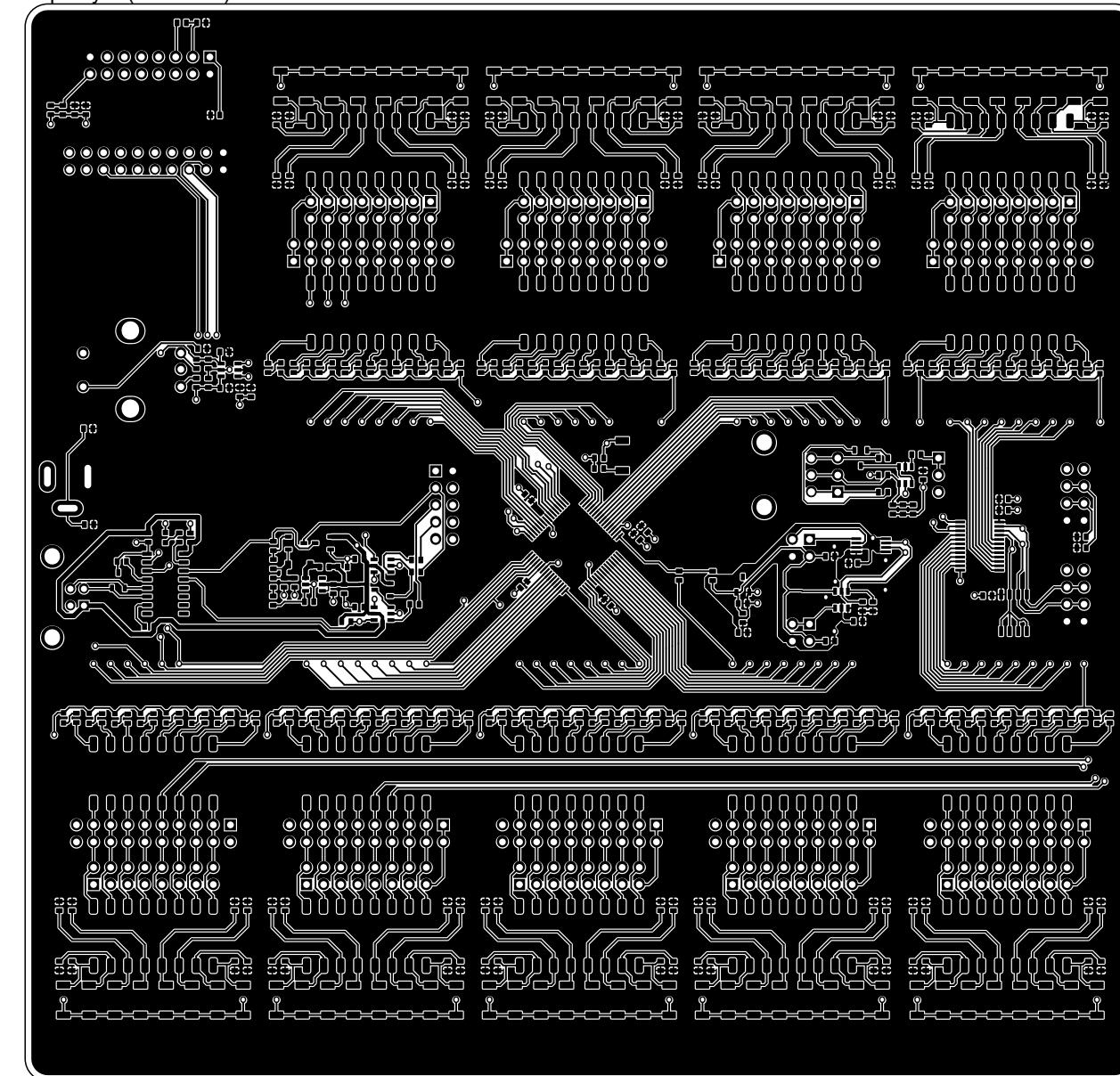
C

D

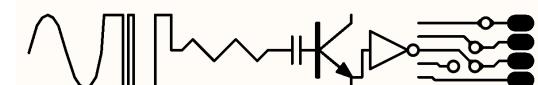
D

# LAYER VIEW : TOP LAYER

Top Layer (Scale 1:1)



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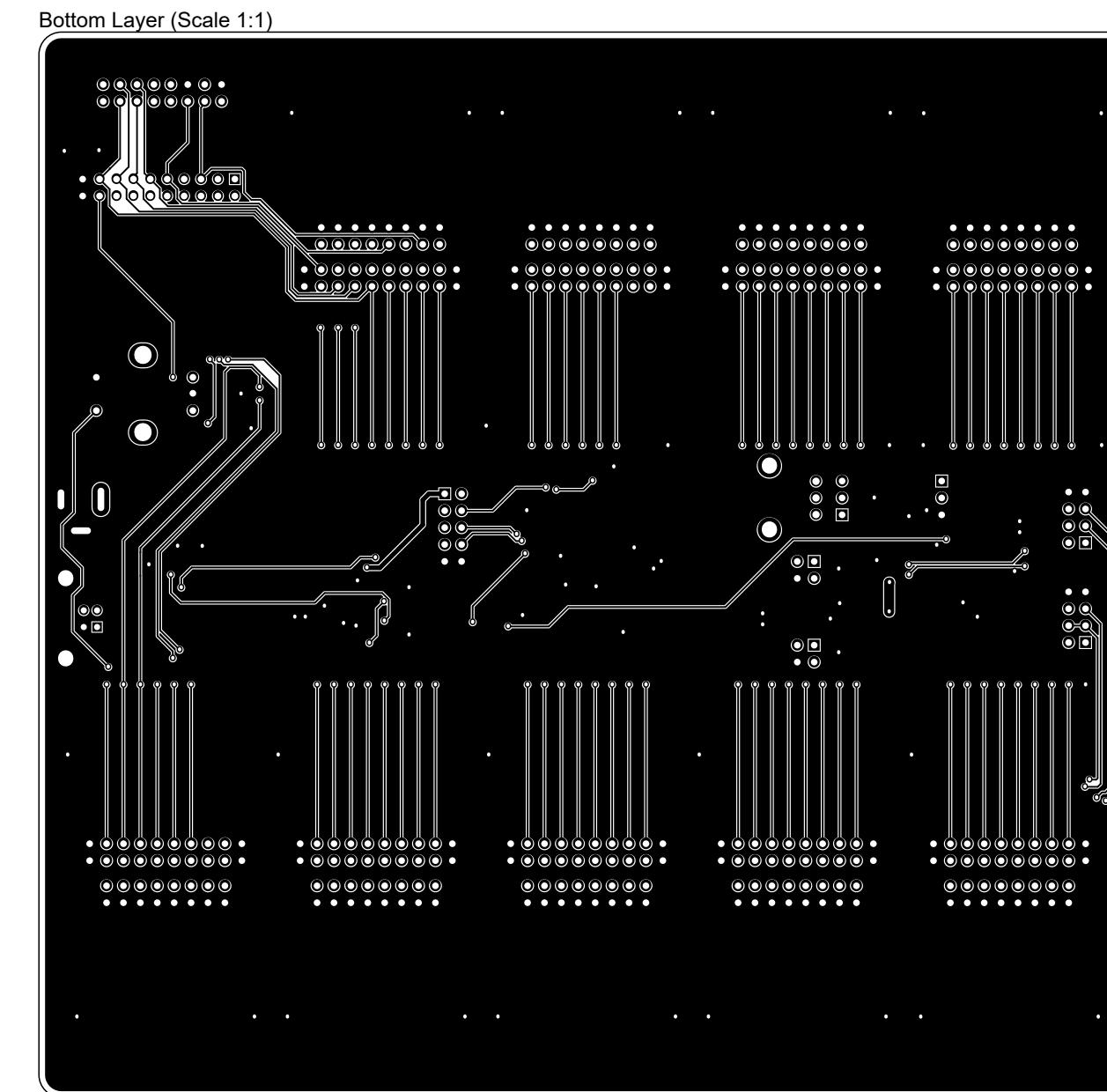


Project AVR64DA64-BREAKOUT.PrjPcb

Version: | Variant AVR64DA64-BREAKOUT-JLCPCB

FABRICATION DRAWING

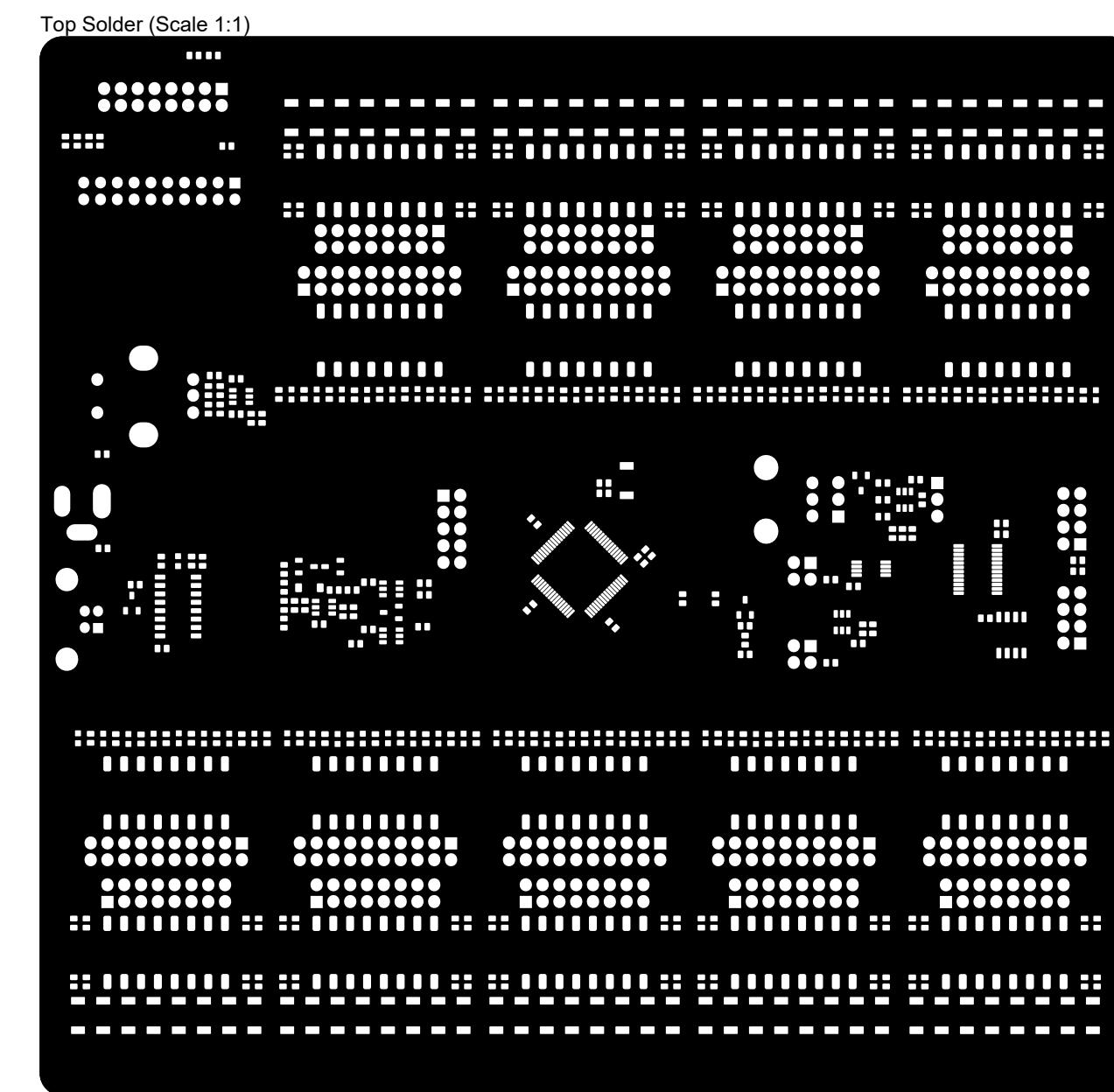
# LAYER VIEW : BOTTOM LAYER



# LAYER VIEW : TOP SOLDER MASK

A

A



B

B

C

C

D

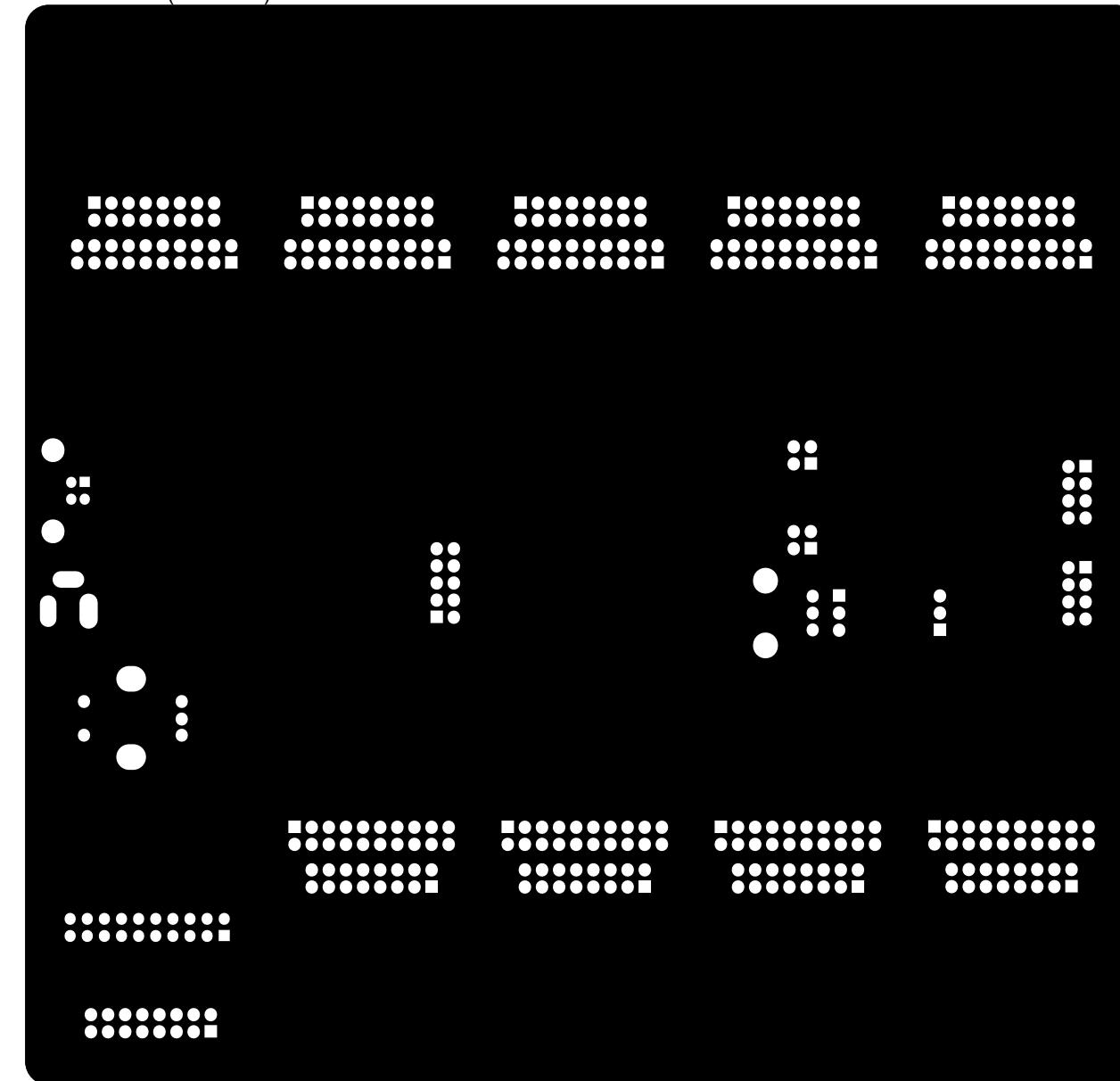
D

# LAYER VIEW : BOTTOM SOLDER MASK

A

A

Bottom Solder (Scale 1:1)



B

B

C

C

D

D

# LAYER VIEW : TOP SILKSCREEN (LEGEND)

A

A

B

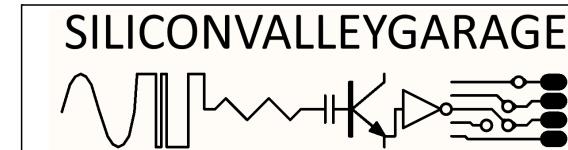
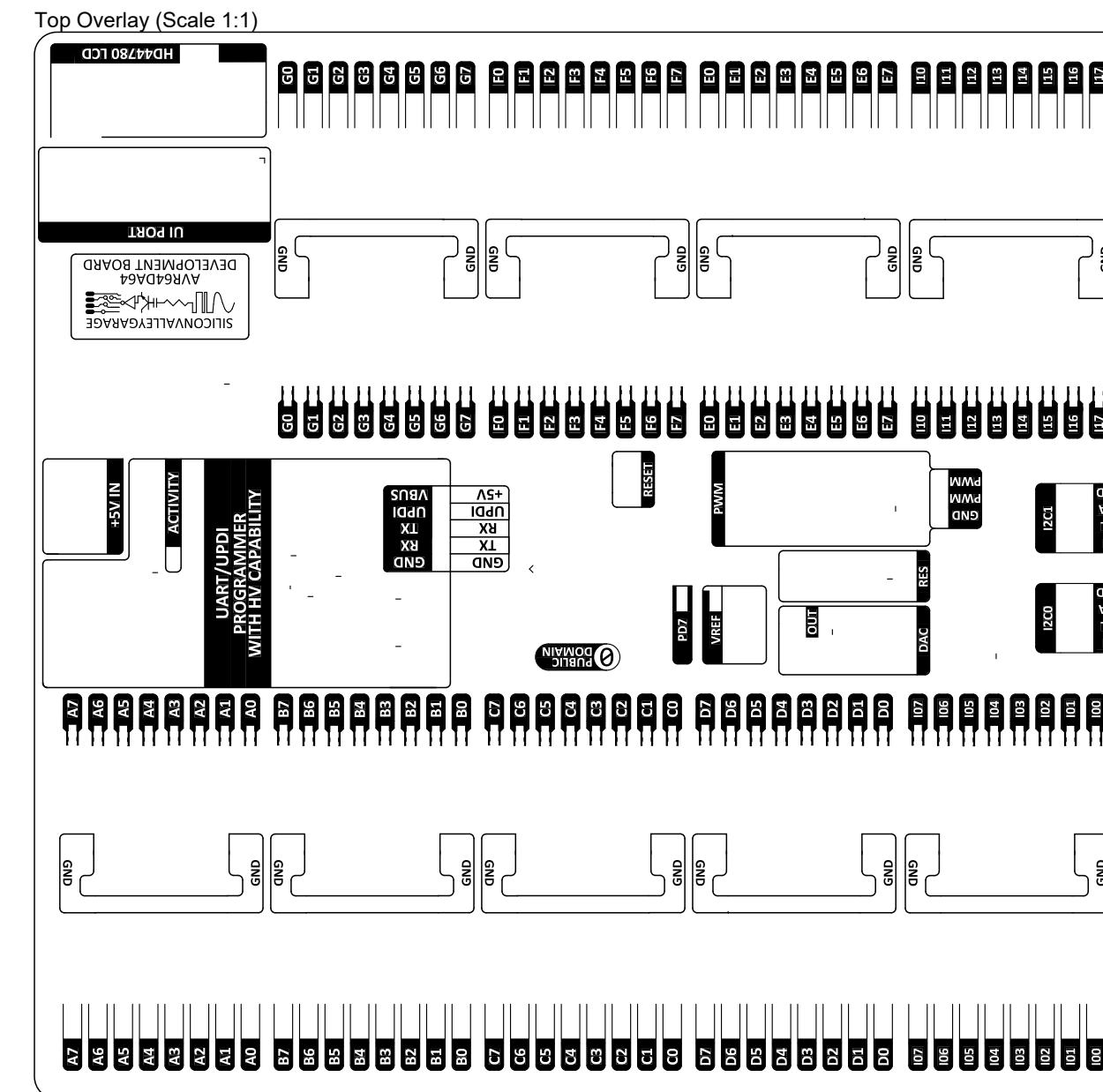
B

C

C

D

D



**Project AVR64DA64-BREAKOUT.PjPcb**

Version: | Variant AVR64DA64-BREAKOUT-JLCPCB

FABRICATION DRAWING

# LAYER VIEW : BOTTOM SILKSCREEN (LEGEND)

A

A

B

B

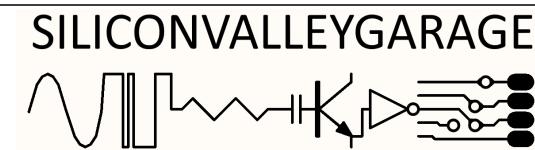
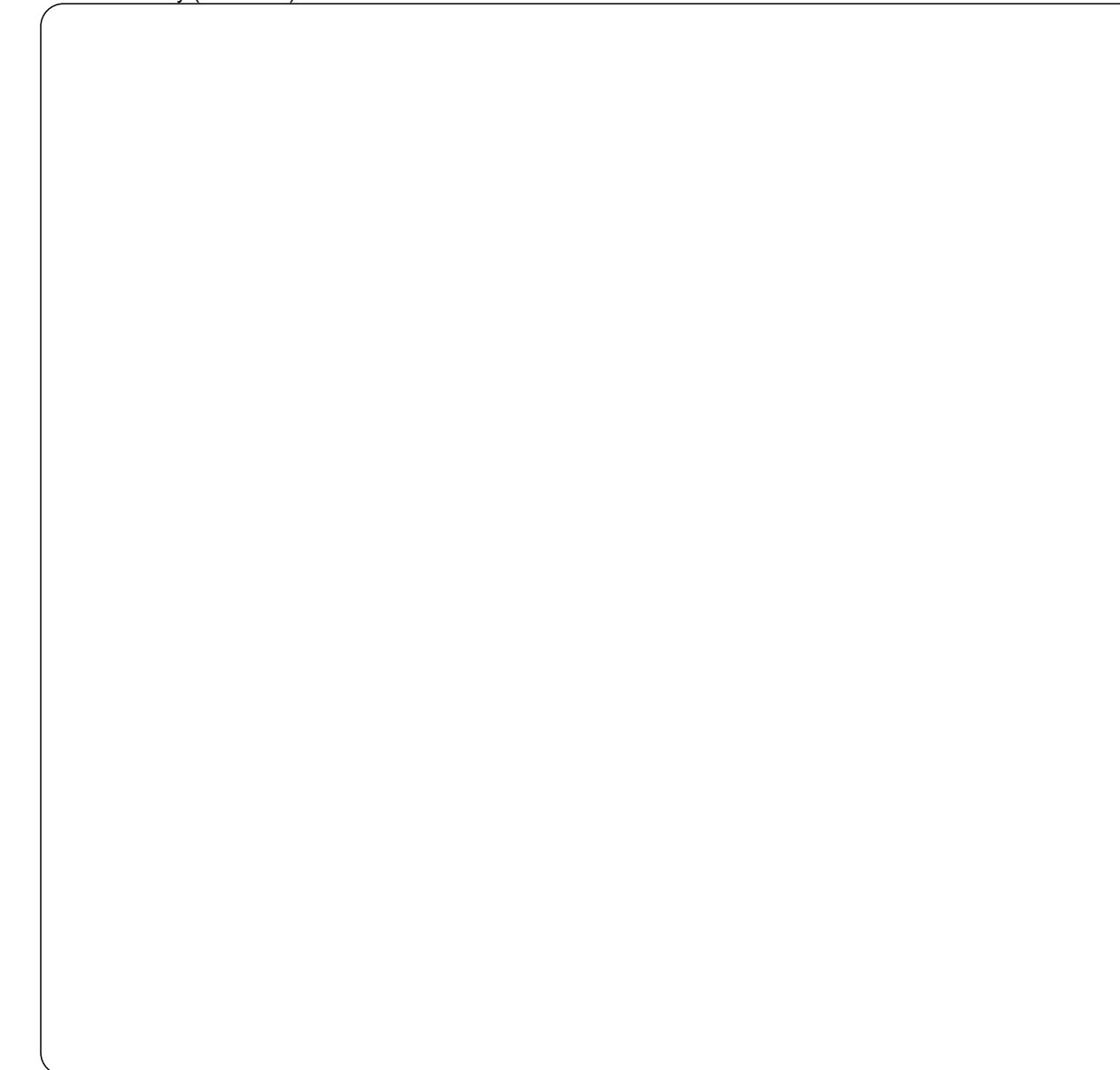
C

C

D

D

Bottom Overlay (Scale 1:1)



**Project AVR64DA64-BREAKOUT.PjPcb**

Version: | Variant AVR64DA64-BREAKOUT-JLCPCB

FABRICATION DRAWING

# GENERAL



## A 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

## B 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

## B 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 PREFERABLY 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.

# 2D VIEW

A

A

B

B

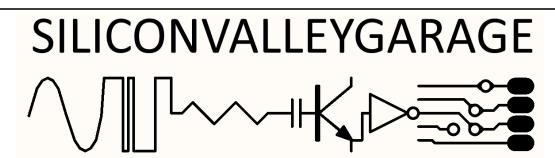
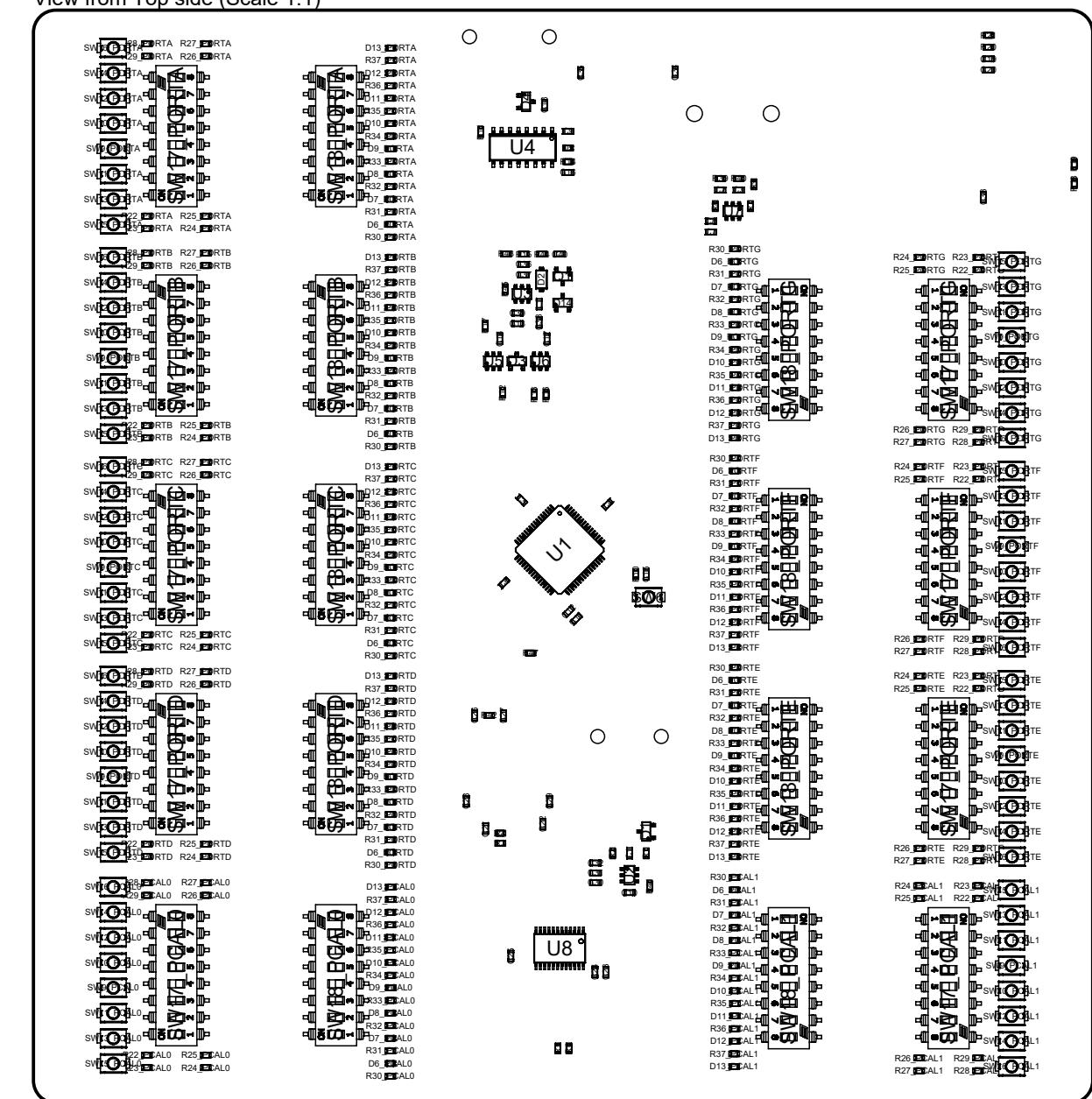
C

C

D

D

View from Top side (Scale 1:1)



**Project AVR64DA64-BREAKOUT.Pcb**

Version: | Variant AVR64DA64-BREAKOUT-JLCPCB

ASSEMBLY DRAWING

1

2

3

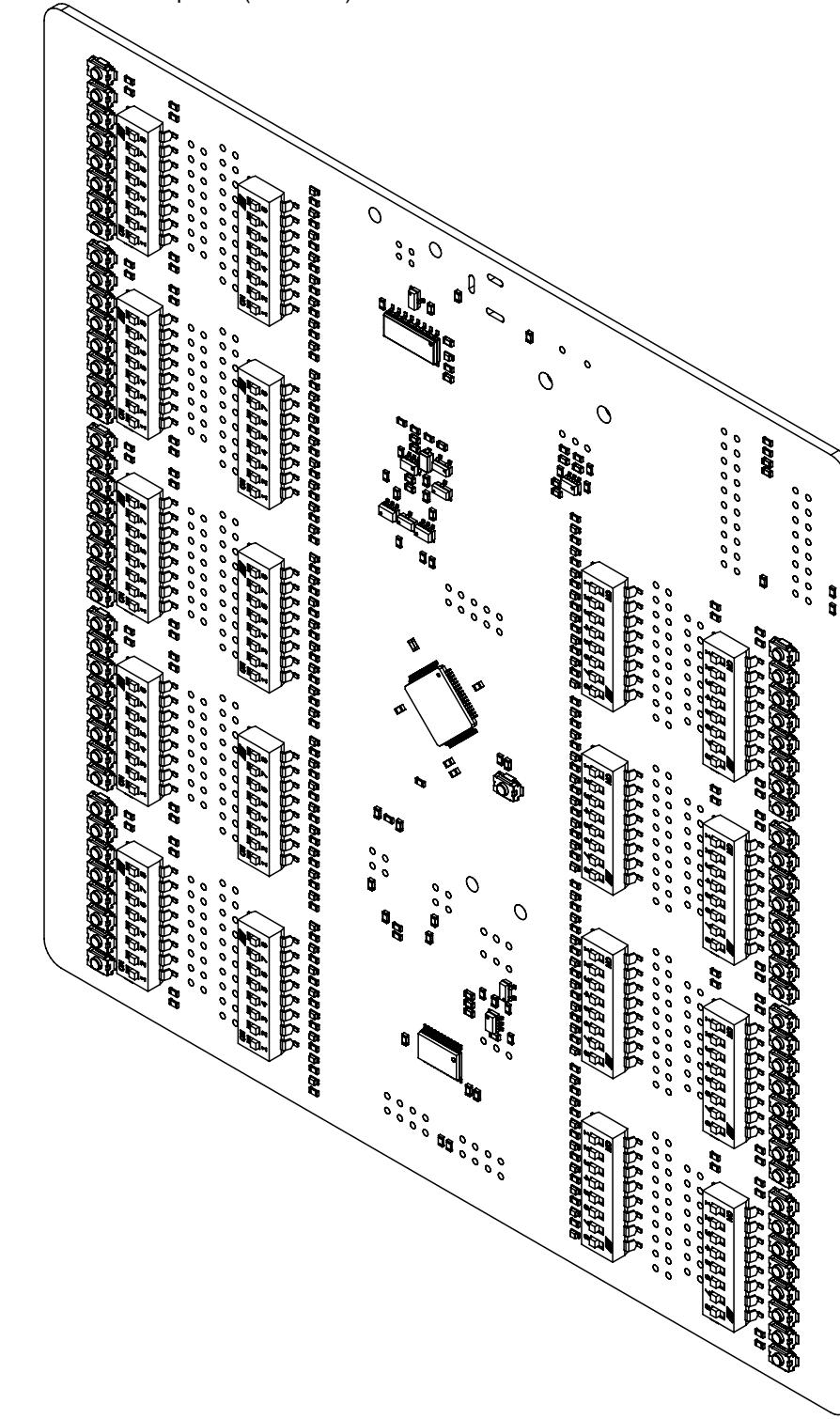
4

5

6

# 3D VIEW

View from Top side (Scale 1:1)



A

A

B

B

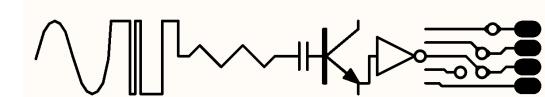
C

C

D

D

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Project AVR64DA64-BREAKOUT.PrjPcb

Version: | Variant AVR64DA64-BREAKOUT-JLCPCB

ASSEMBLY DRAWING

1

2

3

4

5

6

# Bill Of Materials

A

Quantity	Designator	Description	LCSC
18	C1, C4, C7, C11, C16, C19, C23, C26, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39	CAPACITOR,CERAMIC,4u7,16V,X5R,0603	C19666
22	C2, C3, C5, C6, C8, C9, C10, C12, C13, C14, C15, C17, C18, C20, C21, C22, C24, C25, C27, C28, C29, C40	CAPACITOR,CERAMIC,100nF,50V,X7R,0603	C14663
3	D1, D3, D14	DIODE,75V,215mA,SOT23,LOW LEAKAGE	C2500
1	D2	DIODE,SCHOTTKY,40V,1B5819,SOD123	C8598
1	D4	DIODE,TVS,DUAL,NIDIRETINAL,USB,PESD2USB5UX-TR,SOT23	C3709087
73	D5, D6_PCAL0, D6_PCAL1, D6_PORTA, D6_PORTB, D6_PORTC, D6_PORTD, D6_PORTE, D6_PORTF, D6_PORTG, D7_PCAL0, D7_PCAL1, D7_PORTA, D7_PORTB, D7_PORTC, D7_PORTD, D7_PORTE, D7_PORTF, D7_PORTG, D8_PCAL0, D8_PCAL1, D8_PORTA, D8_PORTB, D8_PORTC, D8_PORTD, D8_PORTE, D8_PORTF, D8_PORTG, D9_PCAL0, D9_PCAL1, D9_PORTA, D9_PORTB, D9_PORTC, D9_PORTD, D9_PORTE, D9_PORTF, D9_PORTG, D10_PCAL0, D10_PCAL1, D10_PORTA, D10_PORTB, D10_PORTC, D10_PORTD, D10_PORTE, D10_PORTF, D10_PORTG, D11_PCAL0, D11_PCAL1, D11_PORTA, D11_PORTB, D11_PORTC, D11_PORTD, D11_PORTE, D11_PORTF, D11_PORTG, D12_PCAL0, D12_PCAL1, D12_PORTA, D12_PORTB, D12_PORTC, D12_PORTD, D12_PORTE, D12_PORTF, D12_PORTG, D13_PCAL0, D13_PCAL1, D13_PORTA, D13_PORTB, D13_PORTC, D13_PORTD, D13_PORTE, D13_PORTF, D13_PORTG	LED,SMD,WHITE,42mCd,0603	C2290
1	L1	IND,4u7H,0.6A,0603, LLQM18PN4R7MFRL	C114862
1	Q1	XSTR,PMOS,30V,4A,AO3401,SOT23	C15127
8	R1, R2, R11, R13, R14, R42, R43, R45	RESISTOR,1K,1%,100mW,0603 (1608)	C21190
79	R3, R4, R5, R6, R7, R8, R9, R30_PCAL0, R30_PCAL1, R30_PORTA, R30_PORTB, R30_PORTC, R30_PORTD, R30_PORTE, R30_PORTF, R30_PORTG, R31_PCAL0, R31_PCAL1, R31_PORTA, R31_PORTB, R31_PORTC, R31_PORTD, R31_PORTE, R31_PORTF, R31_PORTG, R32_PCAL0, R32_PCAL1, R32_PORTA, R32_PORTB, R32_PORTC, R32_PORTD, R32_PORTE, R32_PORTF, R32_PORTG, R33_PCAL0, R33_PCAL1, R33_PORTA, R33_PORTB, R33_PORTC, R33_PORTD, R33_PORTE, R33_PORTF, R33_PORTG, R34_PCAL0, R34_PCAL1, R34_PORTA, R34_PORTB, R34_PORTC, R34_PORTD, R34_PORTE, R34_PORTF, R34_PORTG, R35_PCAL0, R35_PCAL1, R35_PORTA, R35_PORTB, R35_PORTC, R35_PORTD, R35_PORTE, R35_PORTF, R35_PORTG, R36_PCAL0, R36_PCAL1, R36_PORTA, R36_PORTB, R36_PORTC, R36_PORTD, R36_PORTE, R36_PORTF, R36_PORTG, R37_PCAL0, R37_PCAL1, R37_PORTA, R37_PORTB, R37_PORTC, R37_PORTD, R37_PORTE, R37_PORTF, R37_PORTG	RESISTOR,4K7,1%,100mW,0603 (1608)	C23162
10	R10, R12, R16, R19, R20, R21, R39, R40, R41, R47	RESISTOR,470R,1%,100mW,0603 (1608)	C23179
1	R15	RESISTOR,18K,1%,100mW,0603 (1608)	C25810

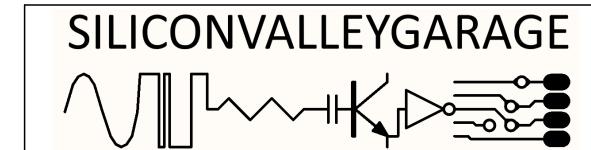
B

C

D

# Bill Of Materials

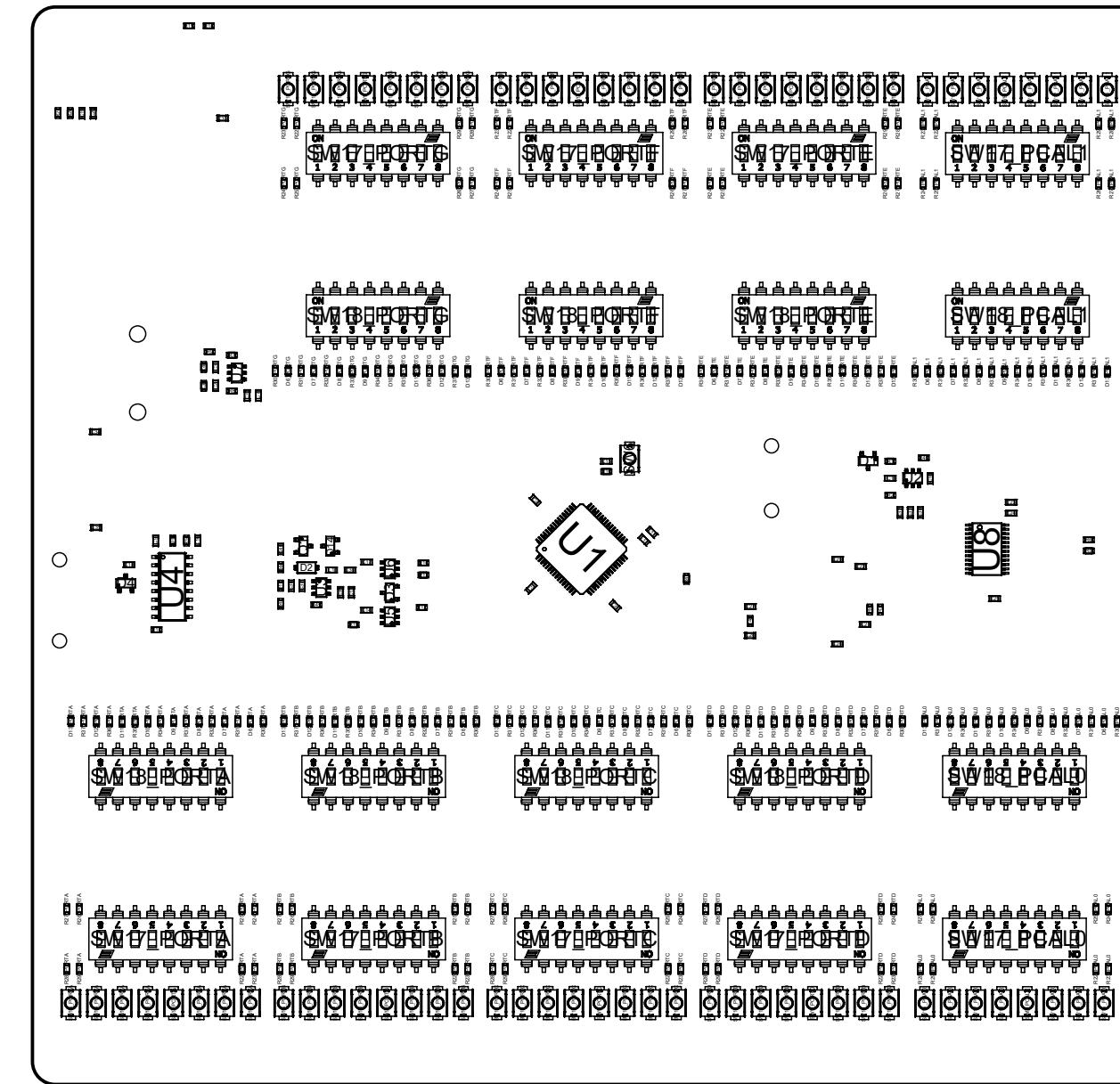
Quantity	Designator	Description	LCSC
75	R17, R18, R22_PCAL0, R22_PCAL1, R22_PORTA, R22_PORTB, R22_PORTC, R22_PORTD, R22_PORTE, R22_PORTF, R22_PORTG, R23_PCAL0, R23_PCAL1, R23_PORTA, R23_PORTB, R23_PORTC, R23_PORTD, R23_PORTE, R23_PORTF, R23_PORTG, R24_PCAL0, R24_PCAL1, R24_PORTA, R24_PORTB, R24_PORTC, R24_PORTD, R24_PORTE, R24_PORTF, R24_PORTG, R25_PCAL0, R25_PCAL1, R25_PORTA, R25_PORTB, R25_PORTC, R25_PORTD, R25_PORTE, R25_PORTF, R25_PORTG, R26_PCAL0, R26_PCAL1, R26_PORTA, R26_PORTB, R26_PORTC, R26_PORTD, R26_PORTE, R26_PORTF, R26_PORTG, R27_PCAL0, R27_PCAL1, R27_PORTA, R27_PORTB, R27_PORTC, R27_PORTD, R27_PORTE, R27_PORTF, R27_PORTG, R28_PCAL0, R28_PCAL1, R28_PORTA, R28_PORTB, R28_PORTC, R28_PORTD, R28_PORTE, R28_PORTF, R28_PORTG, R29_PCAL0, R29_PCAL1, R29_PORTA, R29_PORTB, R29_PORTC, R29_PORTD, R29_PORTE, R29_PORTF, R29_PORTG, R44	RESISTOR,10K,1%,100mW,0603 (1608)	C25804
73	SW6, SW9_PCAL0, SW9_PCAL1, SW9_PORTA, SW9_PORTB, SW9_PORTC, SW9_PORTD, SW9_PORTE, SW9_PORTF, SW9_PORTG, SW10_PCAL0, SW10_PCAL1, SW10_PORTA, SW10_PORTB, SW10_PORTC, SW10_PORTD, SW10_PORTE, SW10_PORTF, SW10_PORTG, SW11_PCAL0, SW11_PCAL1, SW11_PORTA, SW11_PORTB, SW11_PORTC, SW11_PORTD, SW11_PORTE, SW11_PORTF, SW11_PORTG, SW12_PCAL0, SW12_PORTA, SW12_PORTB, SW12_PORTC, SW12_PORTD, SW12_PORTE, SW12_PORTF, SW12_PORTG, SW13_PCAL0, SW13_PCAL1, SW13_PORTA, SW13_PORTB, SW13_PORTC, SW13_PORTD, SW13_PORTE, SW13_PORTF, SW13_PORTG, SW14_PCAL0, SW14_PCAL1, SW14_PORTA, SW14_PORTB, SW14_PORTC, SW14_PORTD, SW14_PORTE, SW14_PORTF, SW14_PORTG, SW15_PCAL0, SW15_PCAL1, SW15_PORTA, SW15_PORTB, SW15_PORTC, SW15_PORTD, SW15_PORTE, SW15_PORTF, SW15_PORTG, SW16_PCAL0, SW16_PORTA, SW16_PORTB, SW16_PORTC, SW16_PORTD, SW16_PORTE, SW16_PORTF, SW16_PORTG	SWITCH,TACT,SMD,2PIN,SMT,TOP ACTUATOR	C720477
18	SW17_PCAL0, SW17_PCAL1, SW17_PORTA, SW17_PORTB, SW17_PORTC, SW17_PORTD, SW17_PORTE, SW17_PORTF, SW17_PORTG, SW18_PCAL0, SW18_PCAL1, SW18_PORTA, SW18_PORTB, SW18_PORTC, SW18_PORTD, SW18_PORTE, SW18_PORTF, SW18_PORTG	SWITCH,DIP,NOX8,SMD,2.54	C319032
1	U1	IC,CPU,ATMEL,AVR64DA64,TQFP64	C5227841
2	U2, U7	IC,LOGIC,SINGLEGATE,DUAL SCHMITT-TRIGER,INVERTER,SOT23-6	C19829598
1	U3	IC,REG,BOOST,AEROSEMI,MT3608	C84817
1	U4	IC,XCVR,USB UART WITH XTAL AND EEPROM,WCH,CH340G-SO16	CH340B
2	U5, U6	IC,ANALOG,SPDT ANALOG SWITCH,SINGLEGATE,TI,SN74LVC1G3157DBVR,SOT23-6	C2673494
1	U8	I2C,16BIT AGILE I/O EXPANDER,INT,NEXPERIA,PCAL95555,TSSOP24	C2669740



Project AVR64DA64-BREAKOUT.PjPcb  
Version: | Variant AVR64DA64-BREAKOUT-JLCPCB  
ASSEMBLY DRAWING

# DESIGNATORS FRONT

View from Top side (Scale 1:1)



# PASTE MASK TOP

Top Paste (Scale 1:1)

