

## Application Notes

PKoB4 is a Microchip Technology debugger platform that is intended to be integrated into a hardware/firmware application demonstration board.

DGI, CDC Interface of PKoB4 is not used. MCP2200 is used for providing USB to UART conversion with Hardware Flow Control. MCP2200 can support baud rates from 300k to 1000k.

Voltage to WBZ451 is fixed by default to 3V derived from the USB connection from the debugger or Battery. It can also be powered by the application external power supply header (1.9V-3.6V) For application power supply for device to operate with PKoB4 and MCP2200, translators are added for PKoB4 and MCP2200.

## Revision History

Revision 1.0:  
Initial Release

Revision 2.0:  
Fixes and improvements

Revision 3.0:  
D3, LED Footprint  
MikroBus UART Rx,Tx  
Pull up resistors

Revision 4.0:  
3.3V regulator for WBZ451 modified to 3V

Revision 5.0:  
D6 LED :MPN changed

Revision 7.0: USB cable added to Box

### LABEL1

[DATE yyyy.mm.dd]  
SN: [SERIAL]  
[ASSY# / REV]





PCBA LABEL 18X6mm



RUBBER PAD D8H2.8

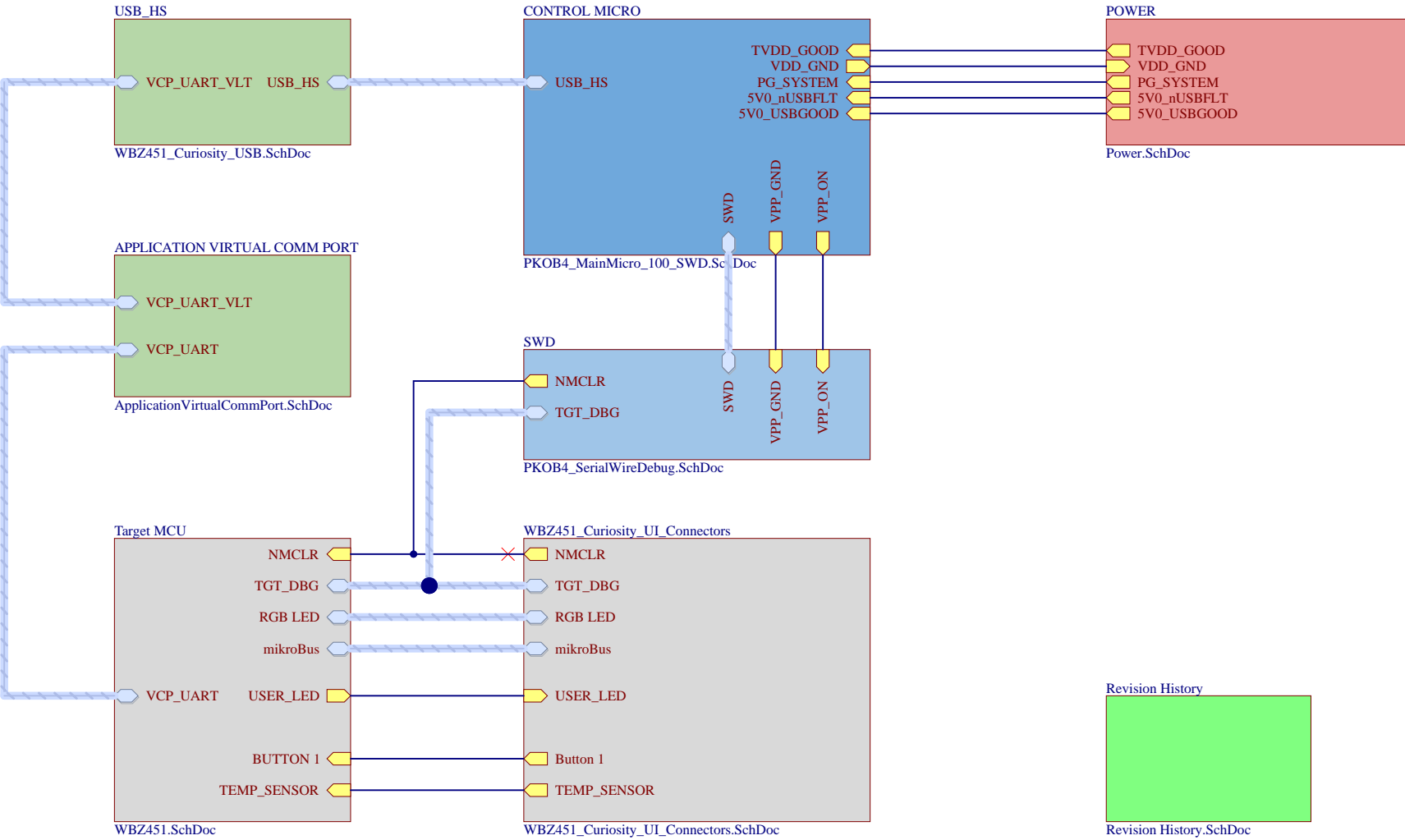




RUBBER PAD D8H2.8

Project Owner: RINU CLEETUS		 MICROCHIP		
PCB Layout Contact: BALAJI NARAYANA				
PartNumber: EV96B94A	Project Title WBZ451 CURIOSITY BOARD	Variant: [No Variations]		
Sheet Title Revision History			<div>Designed with</div>  <div>Altium.com</div>	
Size B	SCH #: 03-00307 PCB #: 04-11423	Rev: 7.0 Rev: 4.0		Date: 9/27/2022 Sheet 1 of 10
File: Revision History.SchDoc				

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# Main System Interconnect



Project Owner: RINU CLEETUS		 <b>MICROCHIP</b>	
PCB Layout Contact: BALAJI NARAYANA			
PartNumber: EV96B94A	Project Title <b>WBZ451 CURIOSITY BOARD</b>	Variant: [No Variations]	
Sheet Title <b>WBZ451 Curiosity Board Top Level</b>		<div>Designed with  <a href="https://www.altium.com">Altium.com</a></div>	
Size B	SCH #: 03-00307		
	PCB #: 04-11423	Rev: 4.0	Sheet 2 of 10
File: WBZ451_Curiosity_TopLevel.SchDoc			

**Power Distribution Switch for PKoB4**

The schematic shows a power distribution switch circuit. Key components include:

- Switch:** MIC2042, configured with VBIAS, VIN, EN, SLEW, UVLOIN, ILIM, and GND pins.
- Power Rails:** VBUS, 3V3 PKOB, 5V0 nUSBFLT, 5V0 USBGOOD, and 5V0.
- Capacitors:** C56 (10uF 25V), C59 (0.1uF 10V), C55 (0.1uF 10V), C75 (0.1uF 10V), C60 (10000pF 50V), C76 (22uF 16V), C81 (24.3k 1%), C77 (10k 5%), C78 (10k 5%), C79 (442k 1%).
- Resistors:** R80 (95.3k 1%), R82 (5.62k 1%), R83 (270R 5%), R77 (10k 5%), R78 (10k 5%), R79 (442k 1%), R81 (24.3k 1%), R84 (10k 5%).
- Other Components:** DNP (No Data Present), PGREF, PWRGD, 3V3 PKOB, 5V0 USBGOOD.

**Notes:**

- 3ms slew rate
- 1.5A output current,  $R83 = CLF / ILIM = 395 / 1.5 = 263.3\text{ohms}$  (22% tolerance)
- 4.4V power good threshold,  $VOUT(GOOD) = 0.23 * (1 + R79 / R83) = 0.23 * (1 + 442k / 24.3k) = 4.41V$
- 4.1V undervoltage in shutdown threshold,  $VUVTH = 0.23 * (1 + 95.3k / 5.62k) = 4.13V$

SEL Pin Low: From USB Port, input current limit governed by USB specs,  
 PROG2= High, ILIMITUSB=500mA  
 SEL Pin High: ILIMITAC = 1.65A  
 PROG1 = 1000V/IREG=  
 1000/100m=10k, IREG = 100mA  
 PROG3=1000V/TERMINATION=1000  
 V/10mA= 100k

### Li-Po Battery Connector/Charger

The schematic diagram illustrates the Li-Po Battery Connector/Charger circuit. Key components and connections include:

- 5V0 Input:** Connected to the top of the diode bridge (LD1) and the VCC pin of the MCP73871 IC.
- Diode Bridge (LD1):** A full-bridge rectifier with diodes connected to pins 1, 2, 3, and 4. Pins 1 and 2 are connected to VBAT\_OUT, while pins 3 and 4 are connected to ground.
- Resistors:**
  - R27 (1k, 0402) and R87 (1k, 0402) are connected between pins 4 and 3, respectively.
  - R25 (0R, 0402) is connected between pins 2 and 1.
  - R31 (0R, 0402) is connected between pins 3 and 4.
  - R29 (10k, 0402) and R30 (10k, 0402) are connected between pins 13 and 12, respectively.
- Capacitors:**
  - C31 (10uF, 25V, 0603) is connected between pins 2 and 1.
  - C32 (4.7uF, 16V, 0603) is connected between pins 16 and 15.
  - C33 (4.7uF, 16V, 0603) is connected between pins 14 and 13.
- MCP73871 IC:** The IC is a Li-Po Battery Connector/Charger. Its pins are connected as follows:
  - Pin 18 (IN) to 5V0.
  - Pin 19 (IN) to 5V0.
  - Pin 2 (VCC) to 5V0.
  - Pin 6 (PG) to ground.
  - Pin 7 (STAT2) to ground.
  - Pin 8 (STAT1/LBO) to ground.
  - Pin 3 (SEL) to ground.
  - Pin 4 (PROG2) to 5V0.
  - Pin 9 (TE) to ground.
  - Pin 17 (CE) to 5V0.
  - Pin 1 (OUT) to VBAT\_OUT.
  - Pin 20 (OUT) to VBAT\_OUT.
  - Pin 16 (VBAT\_SENSE) to VBAT.
  - Pin 15 (VBAT) to VBAT.
  - Pin 14 (VBAT) to VBAT.
  - Pin 5 (THERM) to ground.
  - Pin 13 (PROG1) to ground.
  - Pin 12 (PROG3) to ground.
  - Pin 11 (VSS) to ground.
  - Pin 10 (VSS) to ground.
  - Pin 21 (EP) to ground.

[illegible]

DNP

R36  
1R  
0402  
1%

J6

HDR:2.54 Male 1x2

JP1  
Shunt 2.54mm 1x2 Handle

TGT\_VDD  
TVDD

**Target 3V Regulator**

$t = (C \cdot 0.42) / 140na$

VBAT\_OUT

R116 10k 0402 5%

C53 4.7uF 10V 0402

GND

U10 MCP1727/3V

VIN VIN

SHDN

PWRGD

VOUT

SENSE

CDELAY

EP

GND

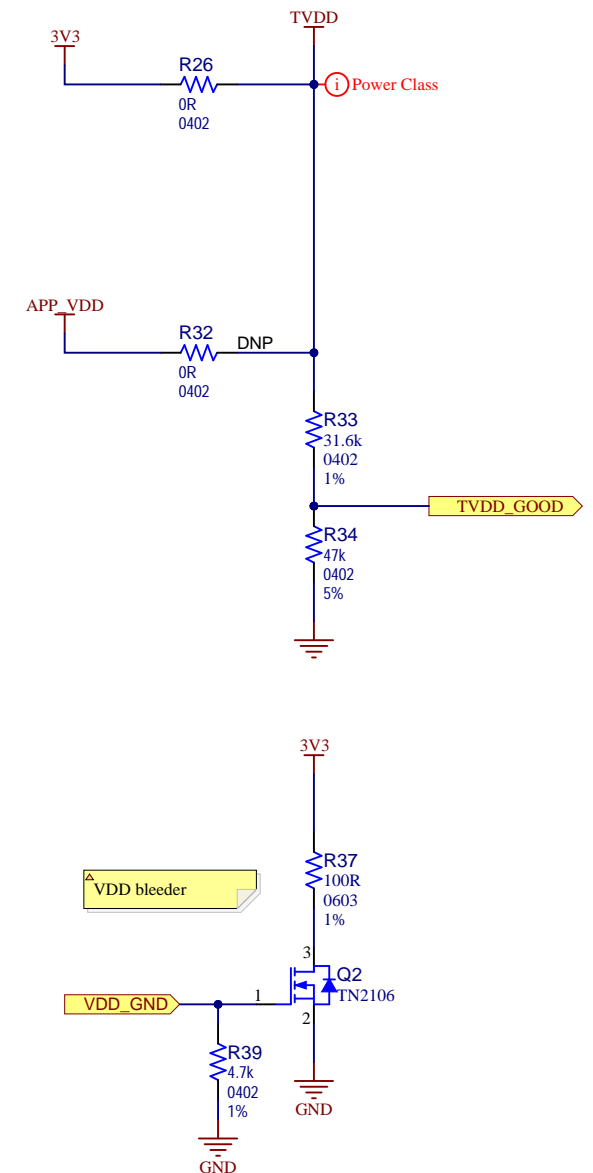
Power Class 1


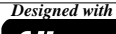
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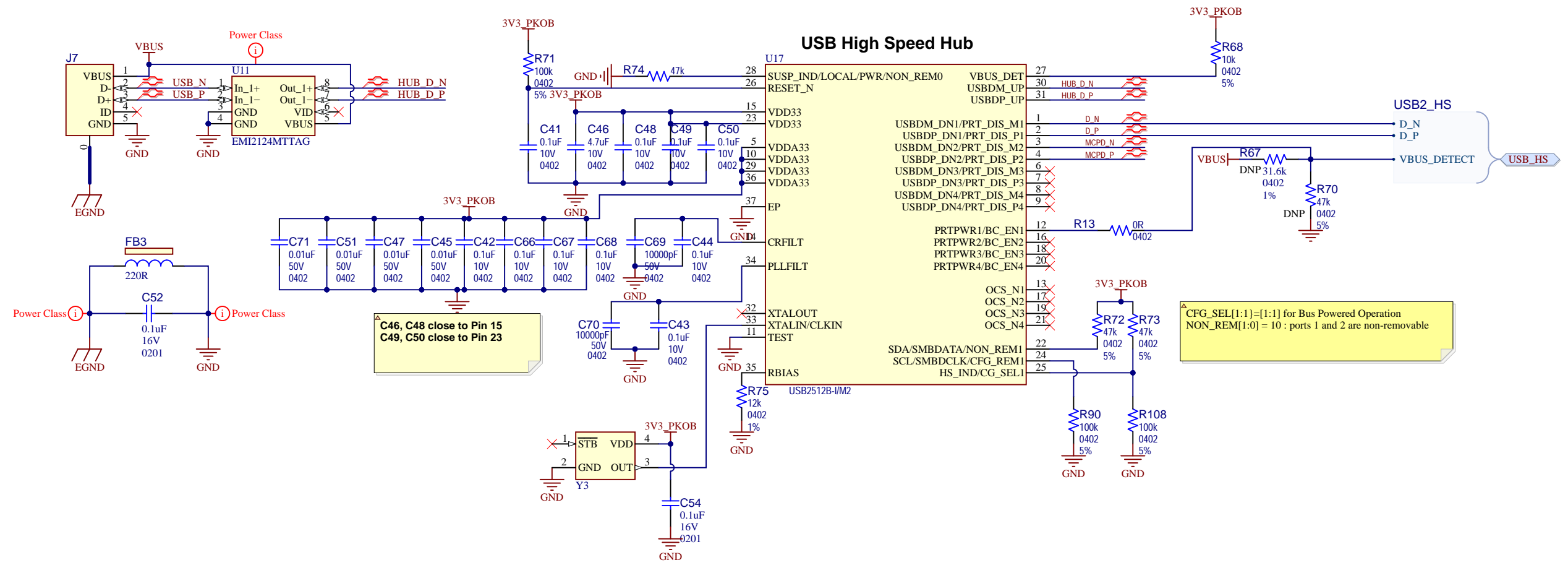
C65 1000pF 50V 0402

C79 4.7uF 10V 0402

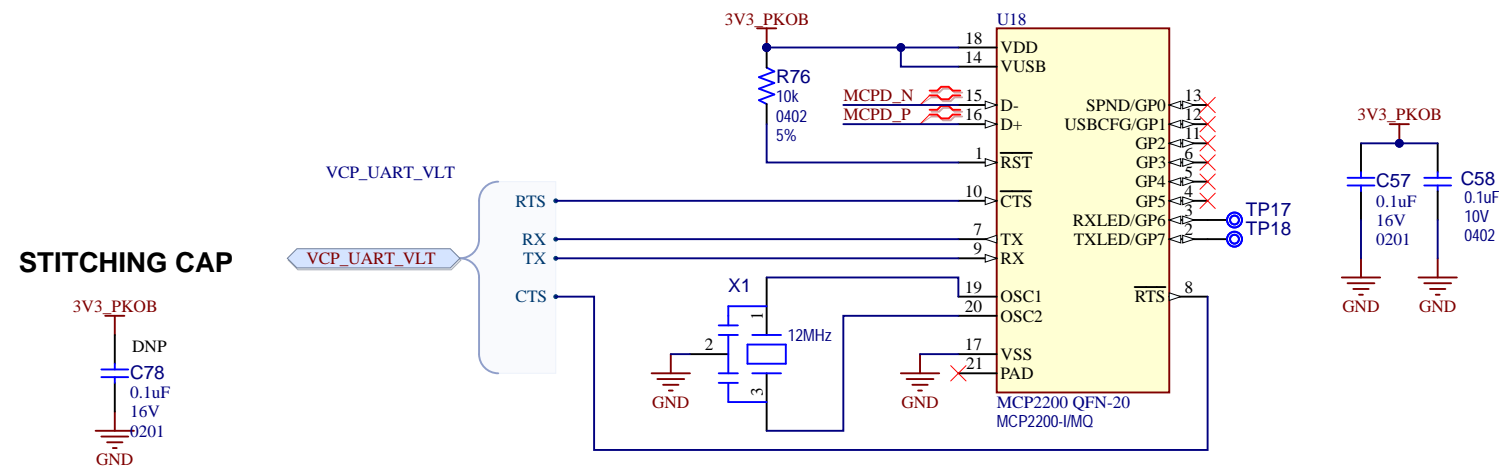
GND



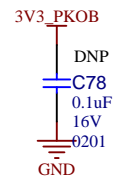
Project Owner: <b>RINU CLEETUS</b>		 <b>MICROCHIP</b>	
PCB Layout Contact: <b>BALAJI NARAYANA</b>			
PartNumber: <b>EV96B94A</b>	Project Title <b>WBZ451 CURIOSITY BOARD</b>	Variant: <a href="#">[No Variations]</a>	
Sheet Title <b>Power</b>			<i>Designed with</i>  <a href="#">Altium.com</a>
Size <b>B</b>	SCH #: <b>03-00307</b>	Rev: <b>7.0</b>	Date: <b>9/27/2022</b>
	PCB #: <b>04-11423</b>	Rev: <b>4.0</b>	Sheet <b>3 of 10</b>
File: <b>Power.SchDoc</b>			





### MCP2200 USB UART Converter

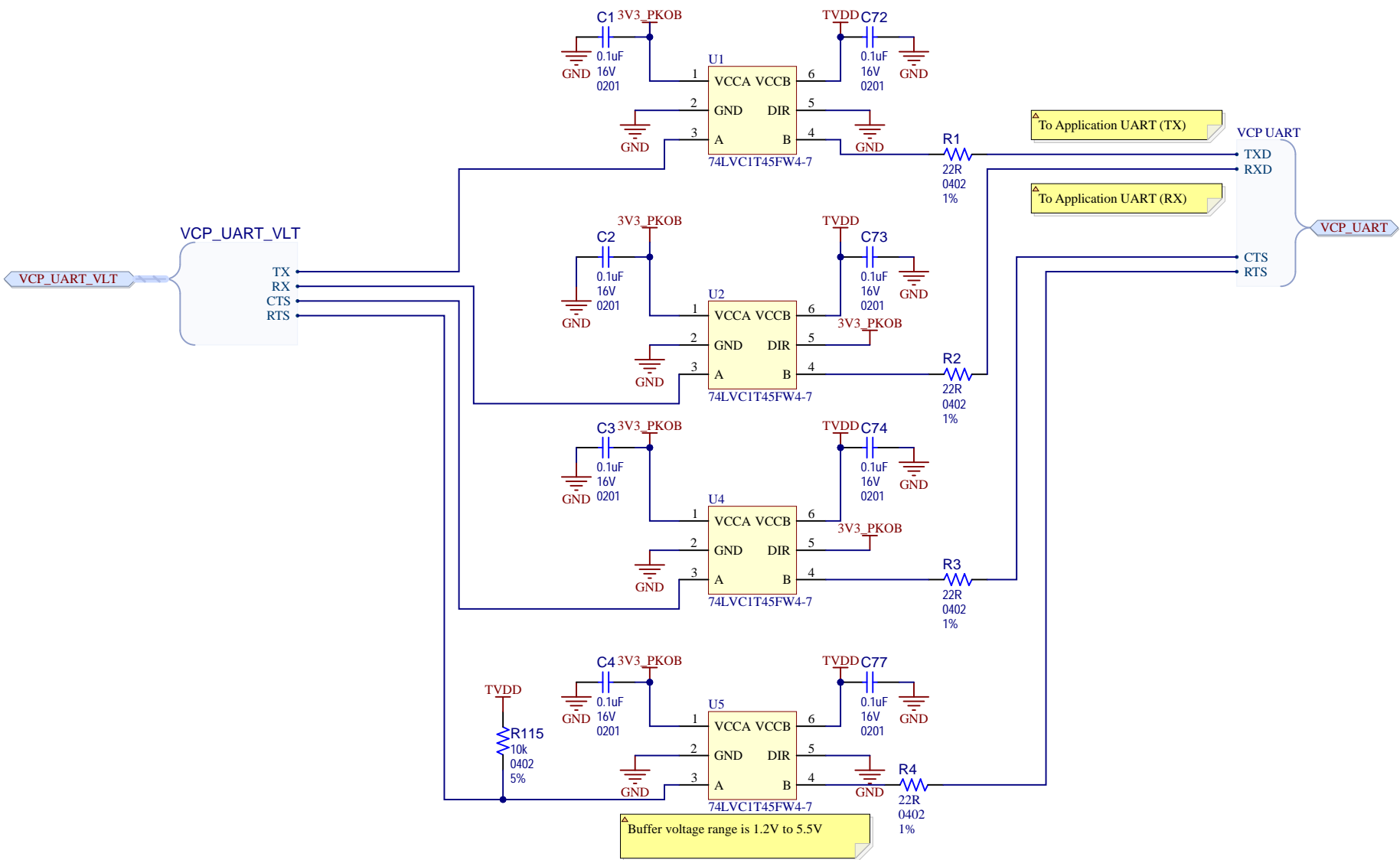




### STITCHING CAP



Project Owner: RINU CLEETUS		 <b>MICROCHIP</b>			
PCB Layout Contact: BALAJI NARAYANA					
PartNumber: EV96B94A	Project Title <b>WBZ451 CURIOSITY BOARD</b>	Variant: [No Variations]			
Sheet Title <b>WBZ451_Curiosity_USB</b>		<div>Designed with</div>  <a href="http://Altium.com">Altium.com</a>			
Size B	SCH #: 03-00307			Rev: 7.0	Date: 9/27/2022
	PCB #: 04-11423			Rev: 4.0	Sheet 4 of 10
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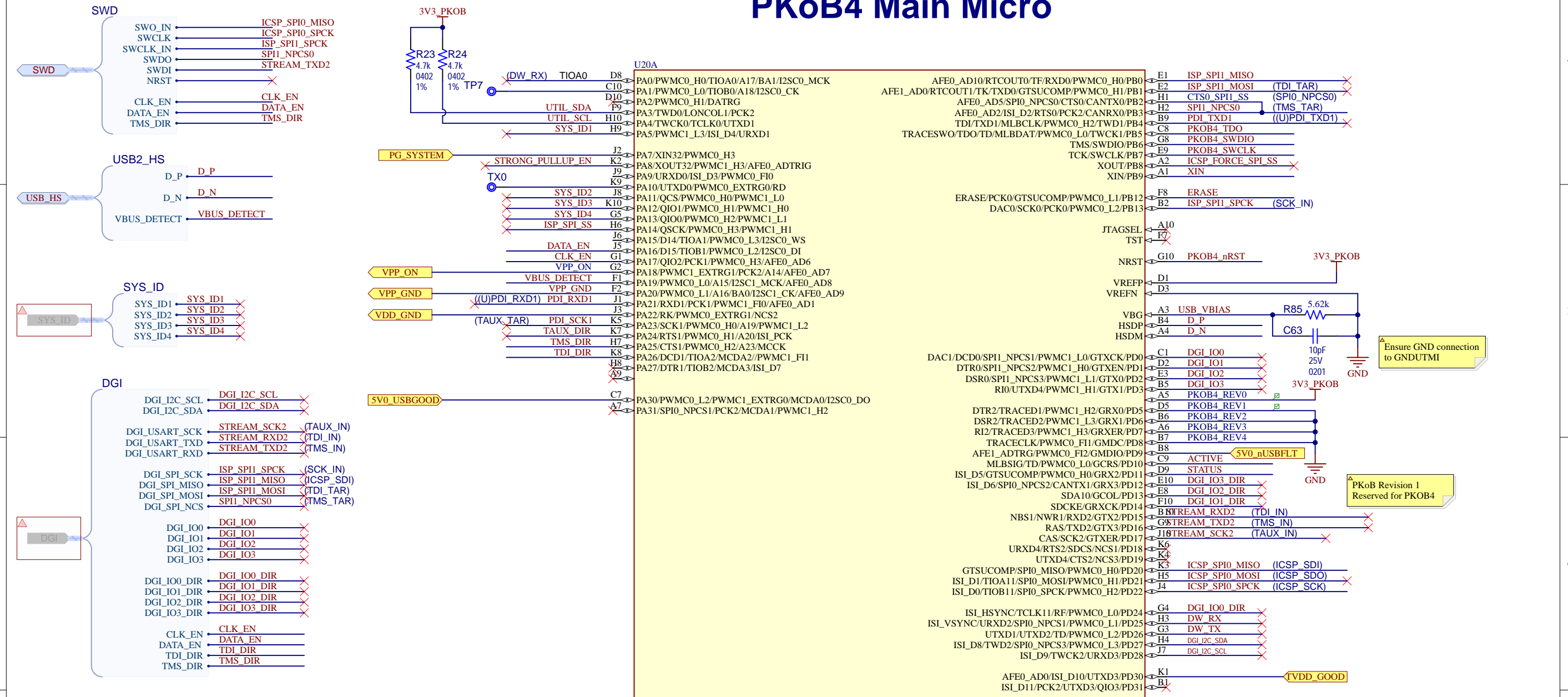
# Application Virtual Comm Port




Project Owner: RINU CLEETUS		 <b>MICROCHIP</b>	
PCB Layout Contact: BALAJI NARAYANA			
PartNumber: EV96B94A	Project Title <b>WBZ451 CURIOSITY BOARD</b>	Variant: [No Variations]	
Sheet Title <b>Application Virtual Comm Port</b>		<div>Designed with  <a href="https://www.altium.com">Altium.com</a></div>	
Size B	SCH #: 03-00307 PCB #: 04-11423		
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PKoB4 Main Micro

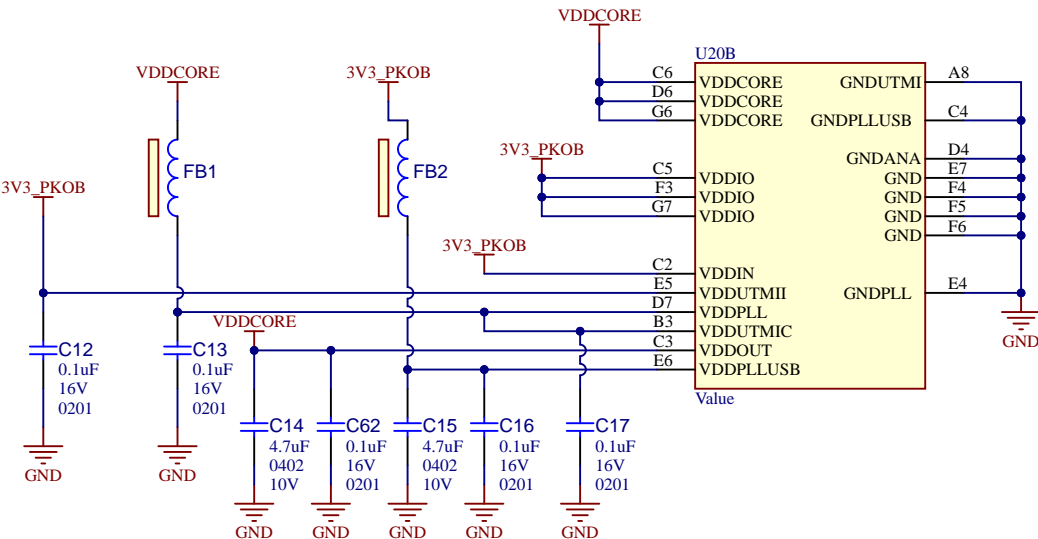
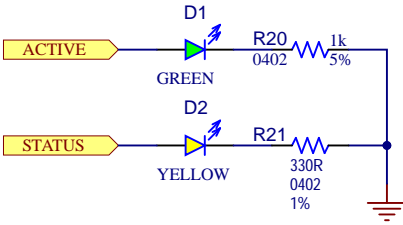
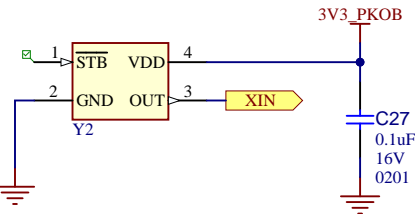
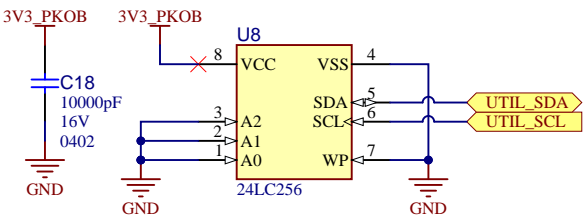
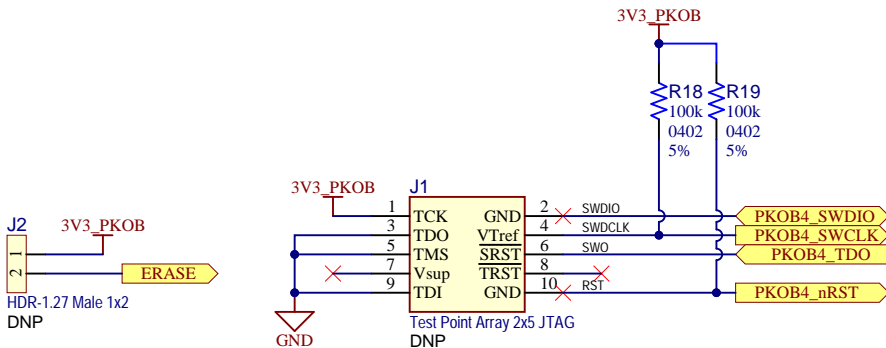


Project Owner: <b>RINU CLEETUS</b>			
PCB Layout Contact: <b>BALAJI NARAYANA</b>			
PartNumber: <b>EV96B94A</b>	Project Title <b>WBZ451 CURIOSITY BOARD</b>	Variant: [No Variations]	
Sheet Title <b>PKoB4_Main Micro_100_SWD</b>			
Size <b>B</b>	SCH #: 03-00307	Rev: 7.0	Date: 9/27/2022
	PCB #: 04-11423	Rev: 4.0	Sheet 6 of 10
File: PKoB4_MainMicro_100_SWD.SchDoc			

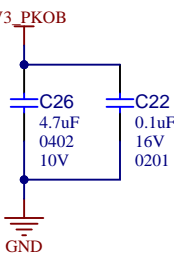
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PKOB4 MISC

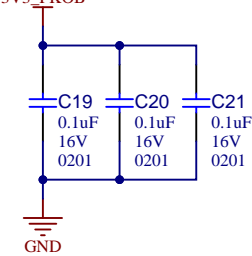
PKoB4 Debug Header



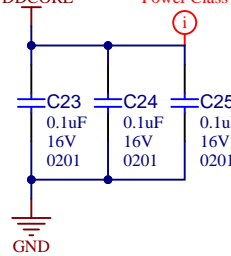
VDDIN Cap




VDDIO Bypass Caps




VDDCORE Bypass Caps

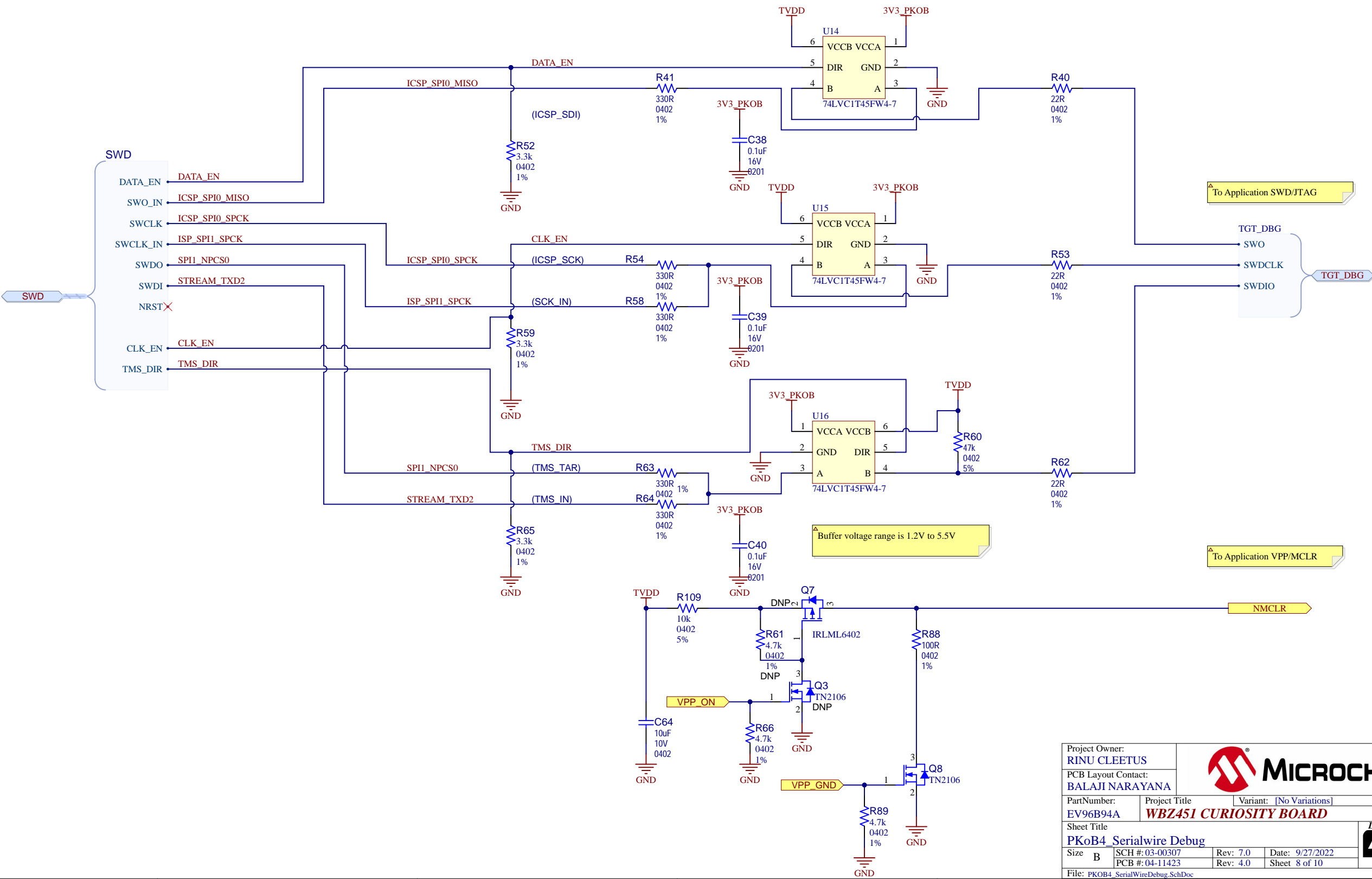




ATSAME70N21B-CNT

Project Owner: <b>RINU CLEETUS</b>			
PCB Layout Contact: <b>BALAJI NARAYANA</b>			
PartNumber: <b>EV96B94A</b>	Project Title <b>WBZ451 CURIOSITY BOARD</b>	Variant: [No Variations]	
Sheet Title <b>PKoB4_Main Micro_100_Misc.</b>			
Size <b>B</b>	SCH #: 03-00307	Rev: 7.0	Date: 9/27/2022
	PCB #: 04-11423	Rev: 4.0	Sheet 7 of 10
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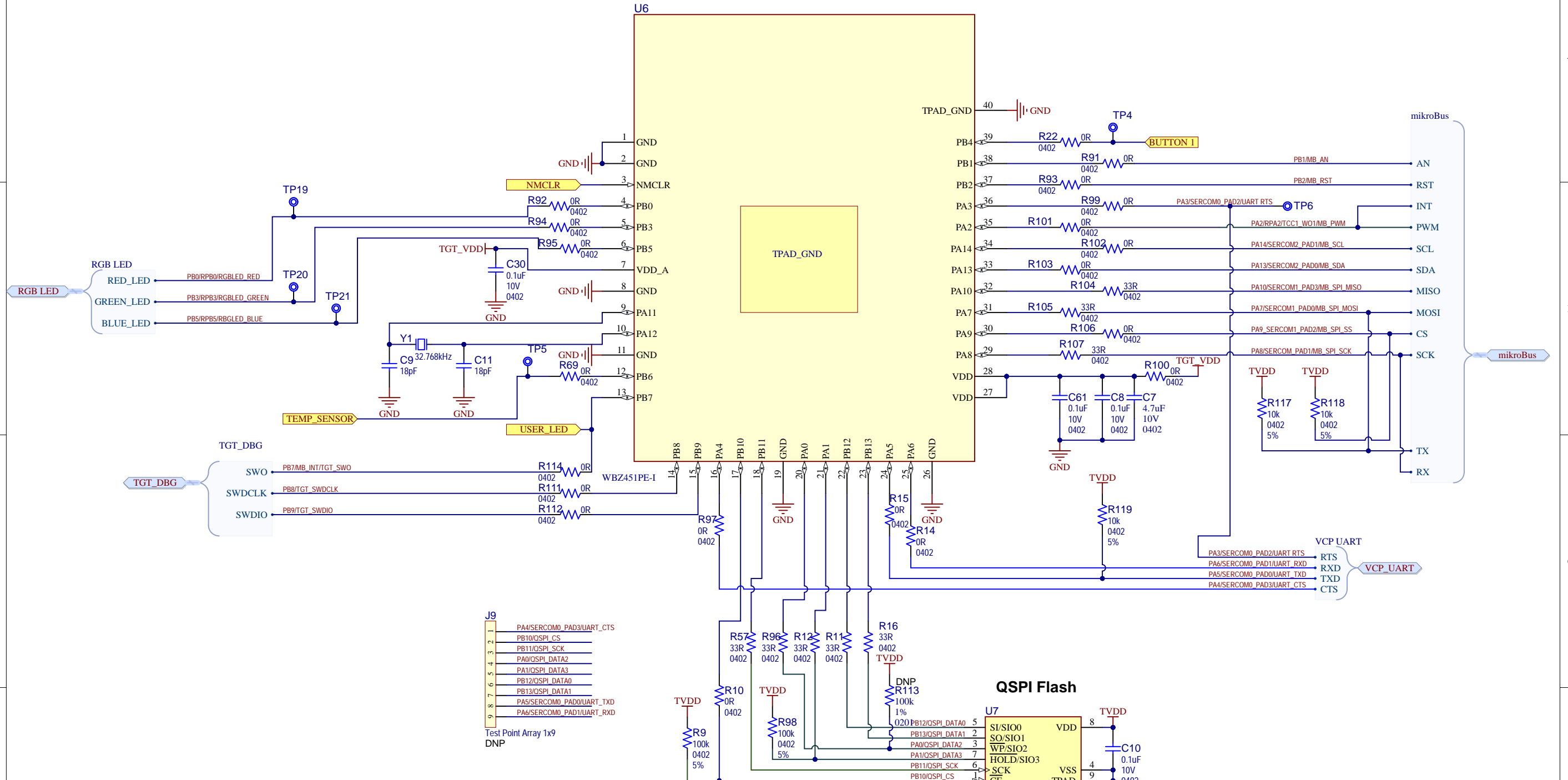
# Serial Wire Debug



Project Owner: RINU CLEETUS		 <b>MICROCHIP</b>	
PCB Layout Contact: BALAJI NARAYANA			
PartNumber: EV96B94A	Project Title <b>WBZ451 CURIOSITY BOARD</b>	Variant: [No Variations]	
Sheet Title <b>PKoB4_Serialwire Debug</b>		<div>Designed with  <a href="https://www.altium.com">Altium.com</a></div>	
Size B	SCH #: 03-00307 PCB #: 04-11423		
File: PKoB4_SerialWireDebug.SchDoc			



WBZ451



A

B

C

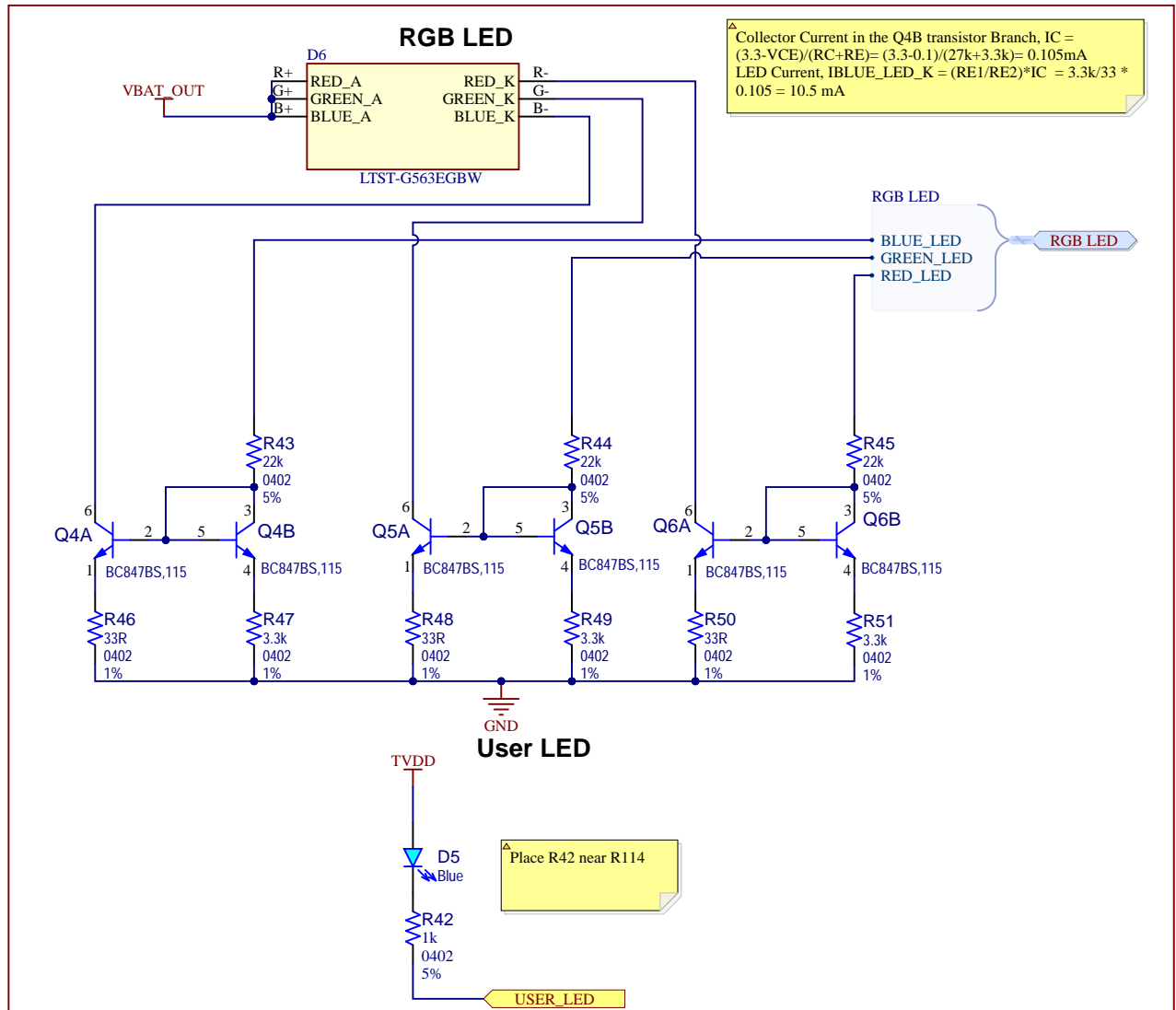
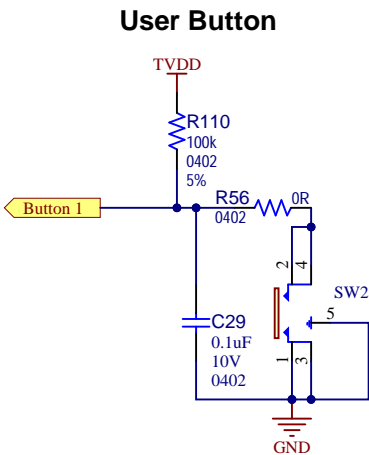
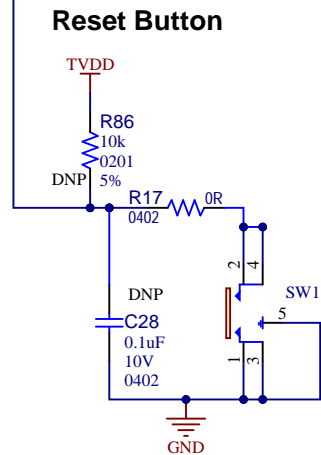
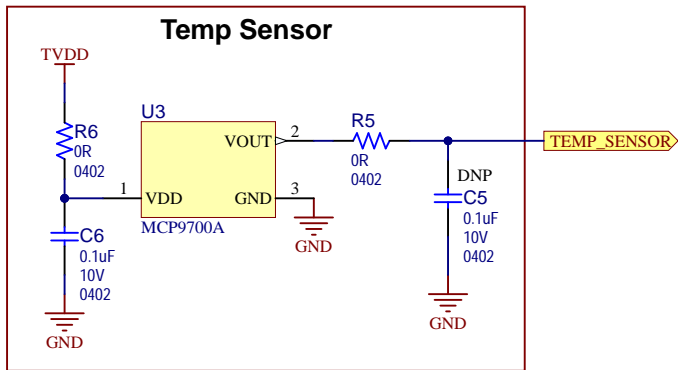
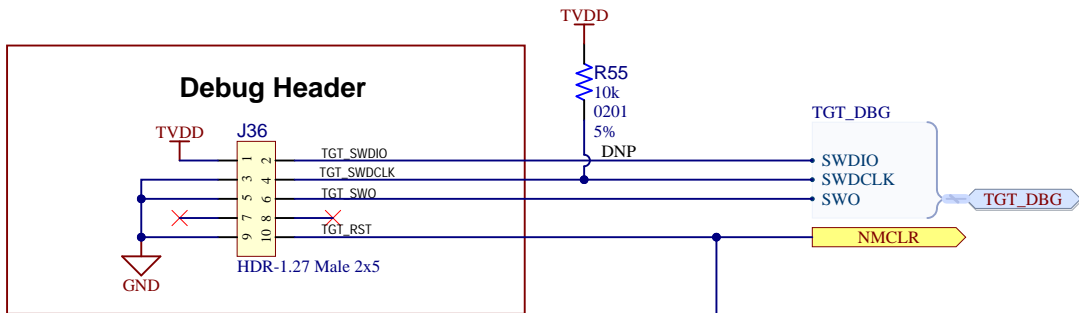
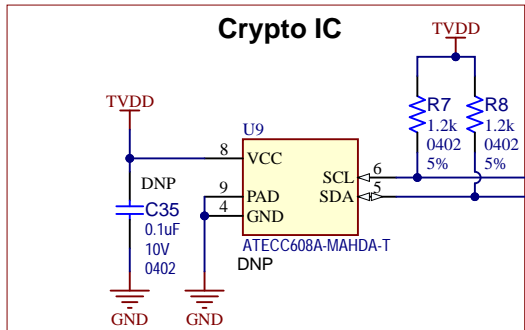
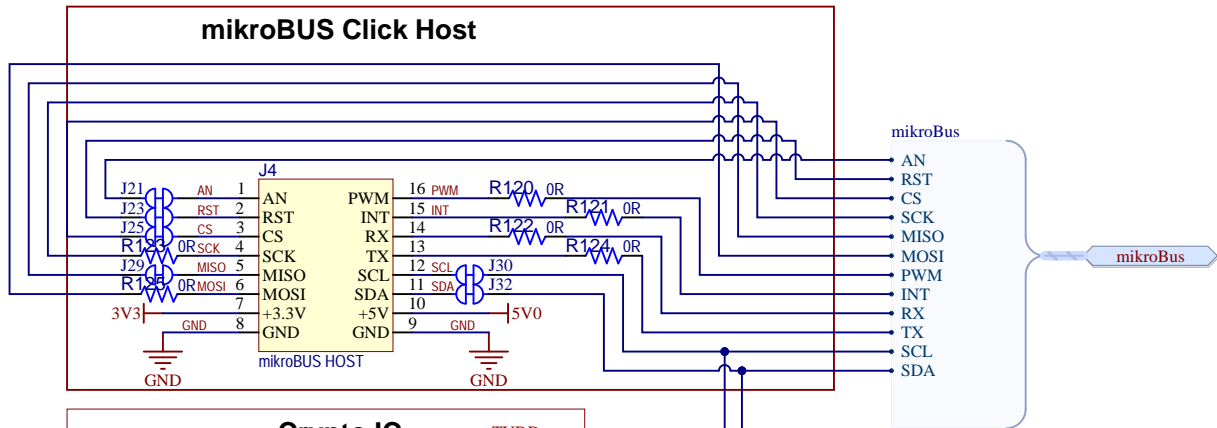
D



A

B

C

D



Project Owner: RINU CLEETUS		 <b>MICROCHIP</b>			
PCB Layout Contact: BALAJI NARAYANA					
PartNumber: EV96B94A	Project Title WBZ451 CURIOSITY BOARD	Variant: [No Variations]			
Sheet Title WBZ451_Curiosity_UI_Conn		<div>Designed with</div> 			
Size B	SCH #: 03-00307			Rev: 7.0	Date: 9/27/2022
	PCB #: 04-11423			Rev: 4.0	Sheet 10 of 10
File: WBZ451_Curiosity_UI_Connectors.SchDoc		Altium.com			