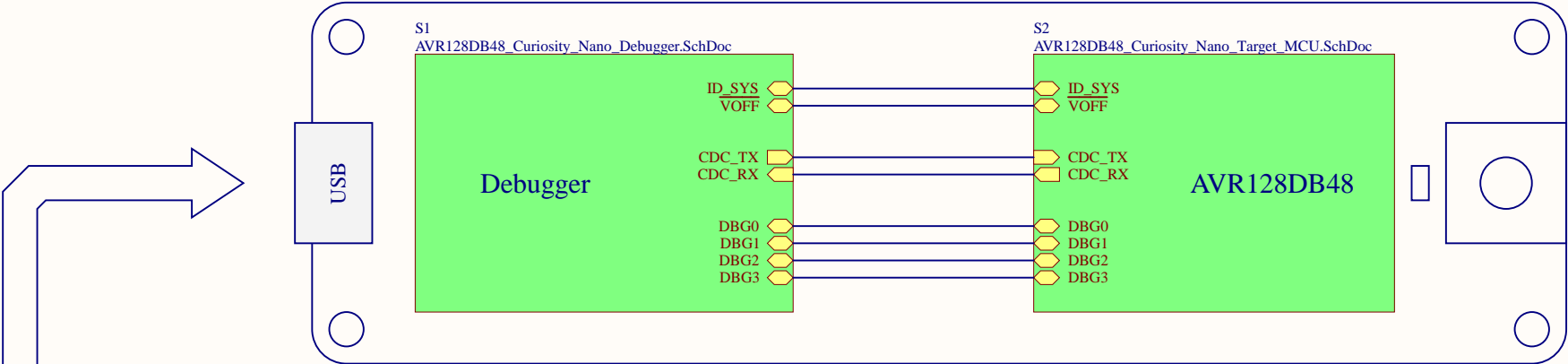
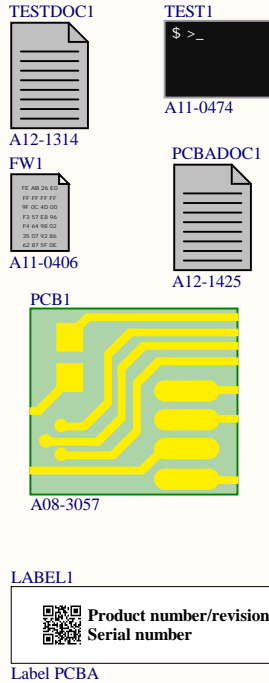
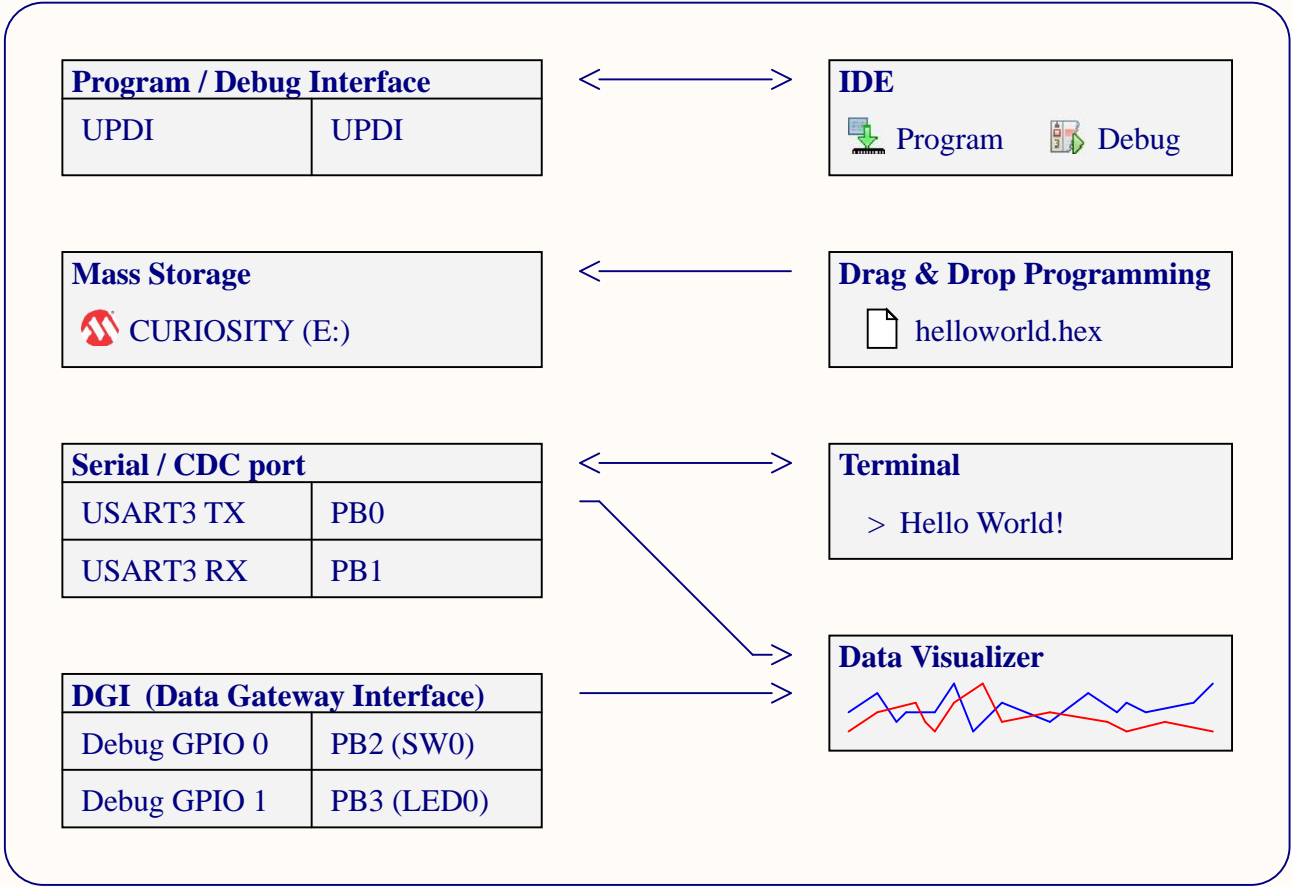


AVR128DB48 Curiosity Nano



On-Board Peripherals		
LED0	PB3	Active Low
SW0	PB2	Active Low



S3
AVR128DB48_Curiosity_Nano_Revision_History.SchDoc

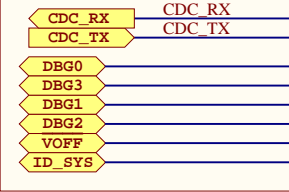
AVR128DB48

NOTE on UART/CDC:

RX/TX on the header denotes the input/output direction of the signal respective to it's source.

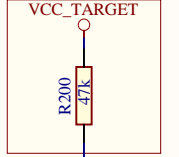
CDC TX is output from the DEBUGGER.
CDC RX is input to the DEBUGGER.
TX is output from the TARGET device.
RX is input to the TARGET device.

DEBUGGER CONNECTIONS

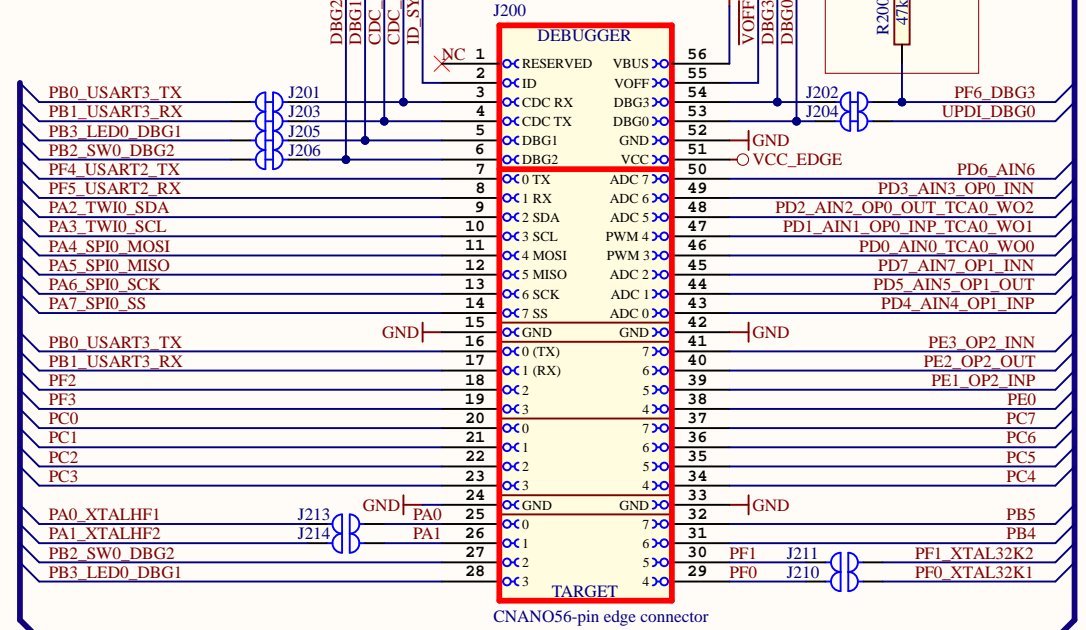


AVR128DB48		
Debugger	Name	Pin
CDC TX	UART3 RX	PB1
CDC RX	UART3 TX	PB0
DBG0	UPDI	UPDI1
DBG1	GPIO1	PB3
DBG2	GPIO0	PB2
DBG3	RESET	PF6
VTG	1.8V - 5.5V	

RESET Pull



DEBUGGER

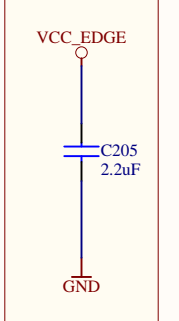


CNANO56-pin edge connector

NOTE on I2C:

No pull-ups on board. Pull-ups should be mounted close to slave device(s).

TARGET BULK



Crystal datasheet:
Crystal = 9pF
max ESR = 70kOhm
Accuracy ±20ppm

AVR48DB128 datasheet:
C_{xin} = 4.0pF (typical value)
C_{xout} = 4.0pF (typical value)
C_l ≈ 1/((1/4.0pF) + (1/4.0pF)) ≈ 2.0pF
Maximum Load = 12.5pF
Maximum ESR = 50kOhm

Estimated C_{pcb} = 0.5pF

Estimated load
C = 2 (C_{crystal} - C_{para} - C_{pcb})
C = 2 (9pF - 2.0pF - 0.5pF)
C = 13.0pF

Selected in design after verification
C = 8.2pF/8.2pF

Crystal datasheet:
Crystal = 12pF
max ESR = 60kOhm
Accuracy ±30ppm

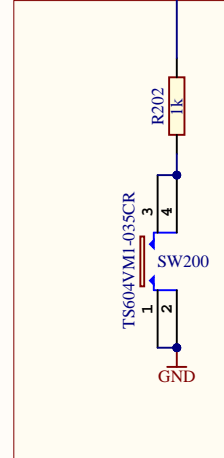
AVR48DB128 datasheet:
C_{xin} = 4.0pF (typical value)
C_{xout} = 4.0pF (typical value)
C_l ≈ 1/((1/4.0pF) + (1/4.0pF)) ≈ 2.0pF
Maximum Load = 12.5pF
Maximum ESR = 50kOhm

Estimated C_{pcb} = 0.5pF

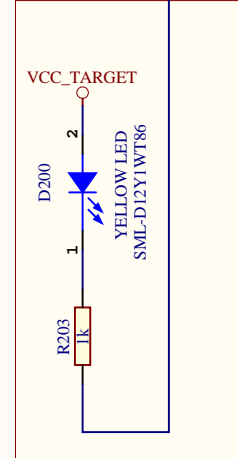
Estimated load
C = 2 (C_{crystal} - C_{para} - C_{pcb})
C = 2 (12pF - 2.0pF - 0.5pF)
C = 19.0pF

Selected in design after verification
C = 15pF/15pF

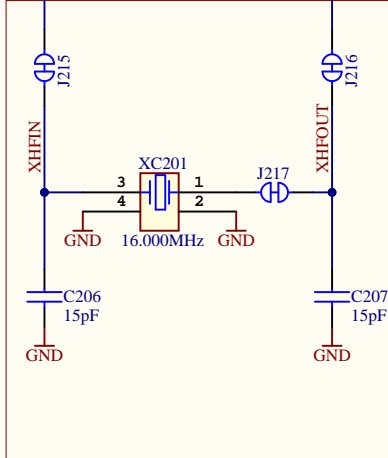
USER BUTTON



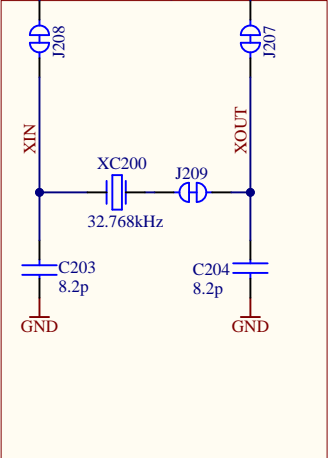
USER LED



16MHz Crystal

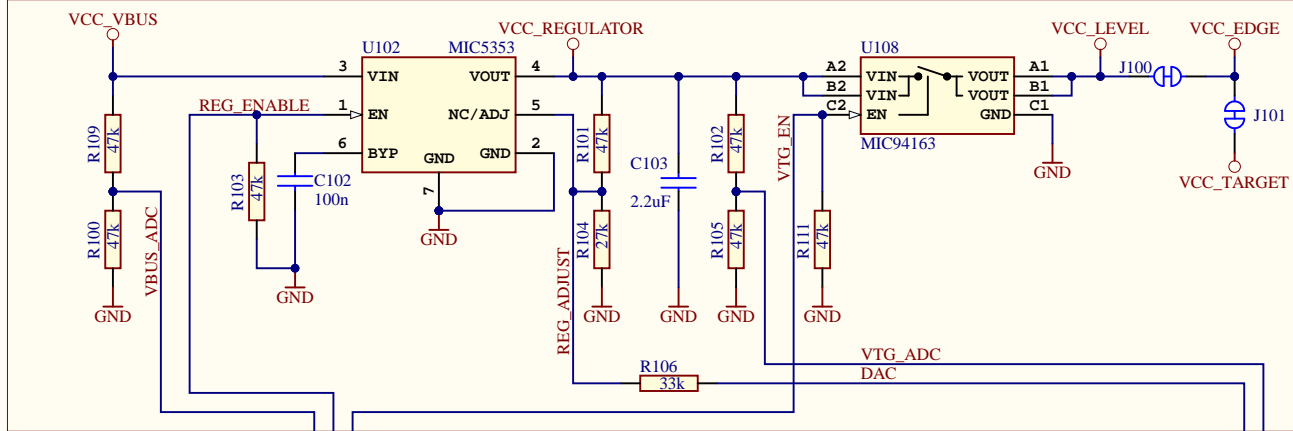


32KHz Crystal



Drawn By: ML		
Engineer: AH		
Project Title AVR128DB48 Curiosity Nano		
Sheet Title Target MCU		
Size A3	PCB Assembly Number: A09-3372 PCB Number: A08-3057	PCBA Revision: 2 PCB Revision: 1
File: AVR128DB48_Curiosity_Nano_Target_MCU.SchDoc		Designed with
Date: 13.08.2020		Page: 2 of 4

TARGET ADJUSTABLE REGULATOR



Adjustable output and limitations:

- The DEBUGGER can adjust the output voltage of the regulator between 1.25V and 5.1V to the target.
- The voltage output is limited by the input (USB), which can vary between 4.40V to 5.25V
- The level shifters have a minimal voltage level of 1.65V and will limit the minimum operating voltage allowed for the target to still allow communication.
- The MIC94163 has a minimal voltage level of 1.70V and will limit the minimum voltage delivered to the target.
- Firmware configuration will limit the voltage range to be within the target specification.

J100:

- Cut-strap used for full separation of target power from the level shifters and on-board regulators.
- For current measurements using the on-board power supply, this strap must be cut and an ammeter connected across.
- For current measurements using an external power supply, this strap could be cut for more accurate measurements. Leakage back through the switch is in the micro ampere range.

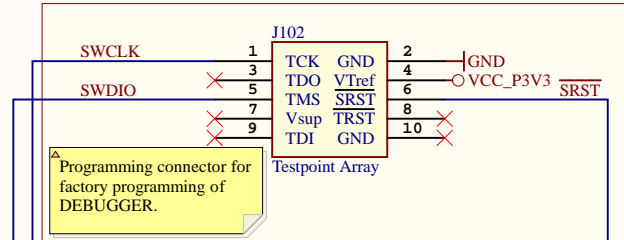
MIC5353:
 Vin: 2.6V to 6V
 Vout: 1.25V to 5.1V
 Imax: 500mA
 Dropout (typical): 50mV@150mA, 160mV @ 500mA
 Accuracy: 2% initial
 Thermal shutdown and current limit

Maximum output voltage is limited by the input voltage and the dropout voltage in the regulator.
 ($V_{max} = V_{in} - \text{dropout}$)

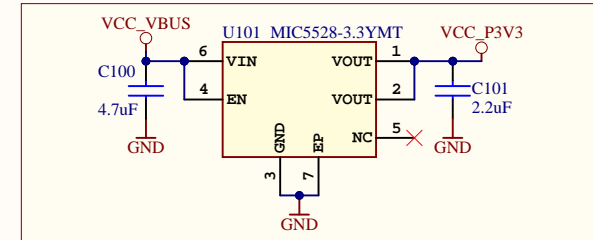
Interface	ICSP TARGET	UPDI TARGET
CDC TX	UART RX	UART RX
CDC RX	UART TX	UART TX
DBG0	DAT	UPDI
DBG1	CLK	GPIO
DBG2	GPIO	GPIO
DBG3	MCLR	RESET
VCC	-	-

MIC5528:
 Vin: 2.5V to 5.5V
 Vout: Fixed 3.3V
 Imax: 500mA
 Dropout: 260mV @ 500mA

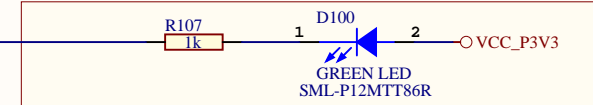
DEBUGGER TESTPOINT



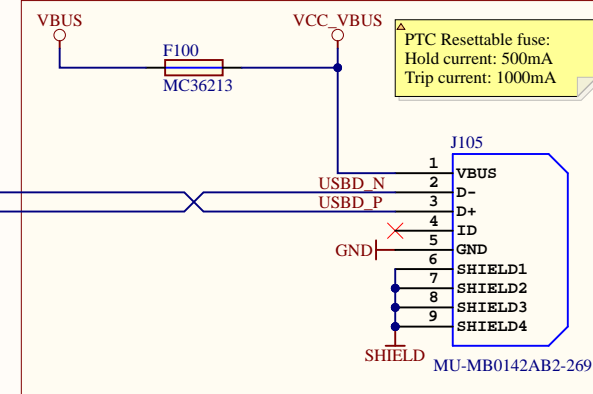
DEBUGGER REGULATOR



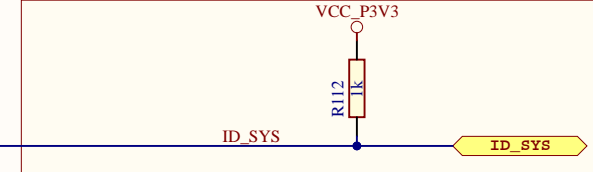
DEBUGGER POWER/STATUS LED



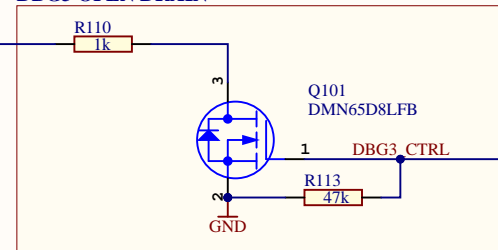
DEBUGGER USB MICRO-B CONNECTOR



ID PIN



DBG3 OPEN DRAIN



Revision History

PCB Assembly Rev 1:

Design Changes:

Initial Design

PCB:

PCB revision 1



PCB Assembly Rev 2:

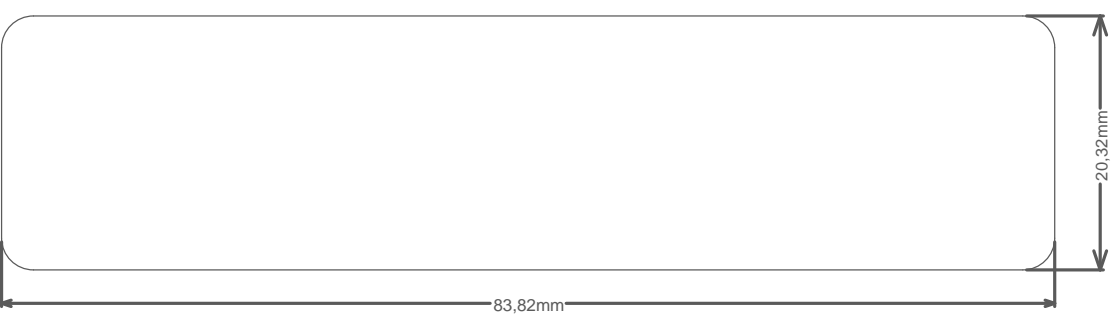
Design Changes:

Changed to crystals from Microchip (Vectron)

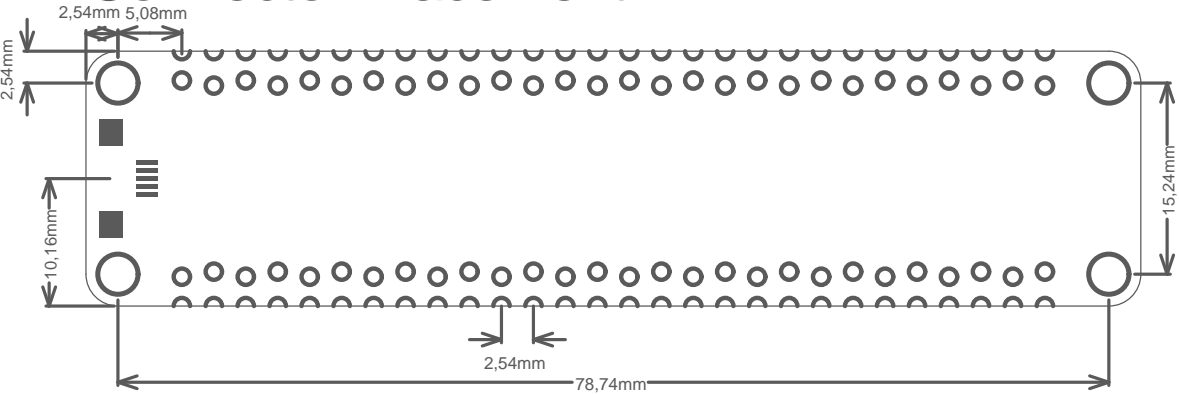
PCB:

PCB revision 1

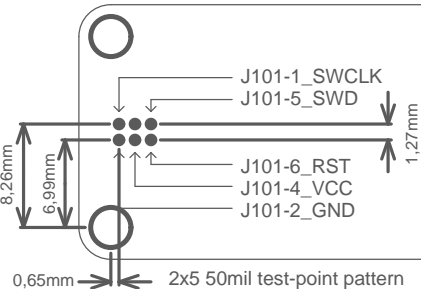
Drawn By: ML		 MICROCHIP		
Engineer: AH				
Project Title AVR128DB48 Curiosity Nano				<div>Designed with</div>  <div>Altium.com</div>
Sheet Title Revision History				
Size A3	PCB Assembly Number: A09-3372		PCBA Revision: 2	
	PCB Number: A08-3057		PCB Revision: 1	
File: AVR128DB48_Curiosity_Nano_Revision_History.SchDoc				Date: 13.08.2020
				Page: 4 of 4

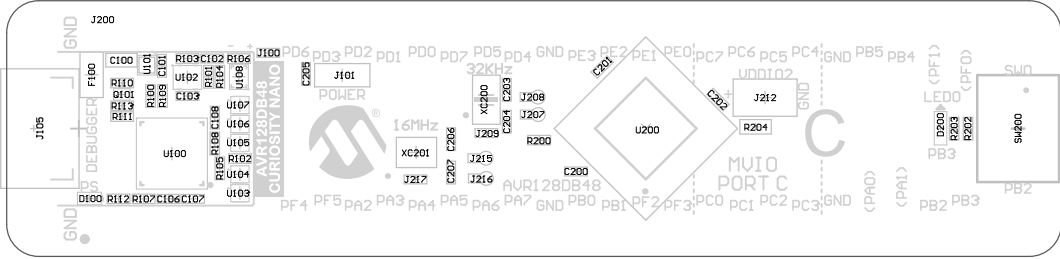


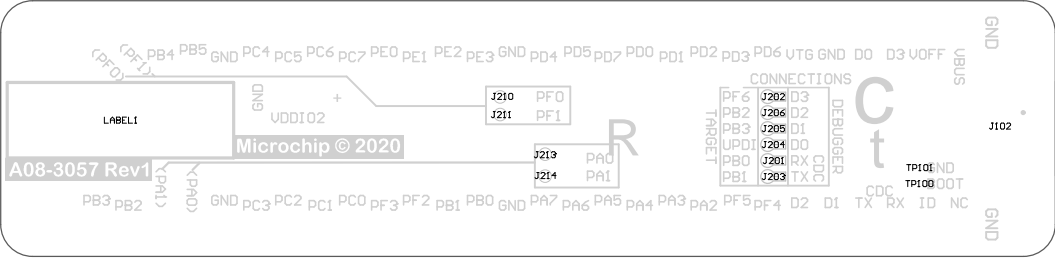
Connector Placement

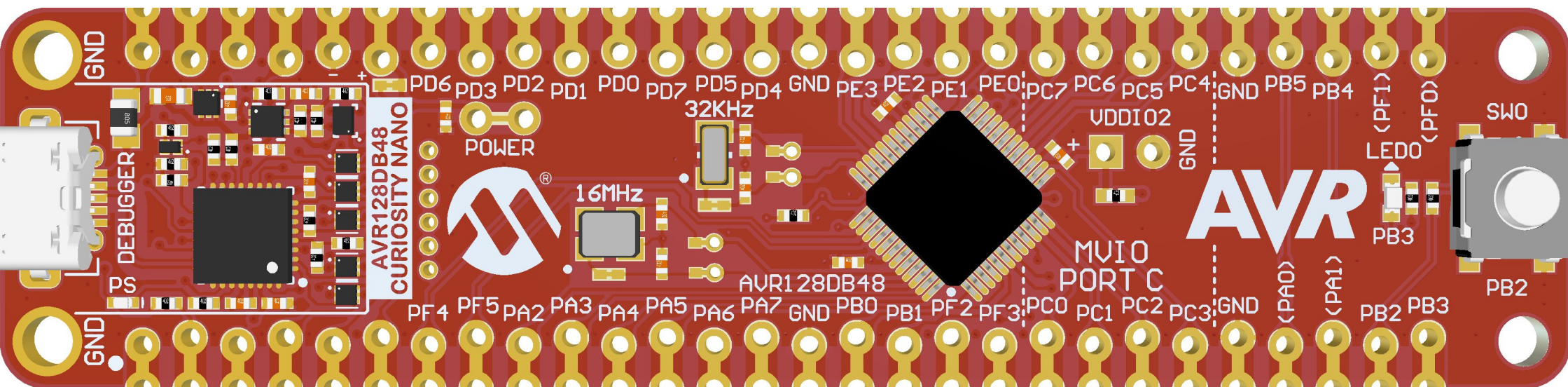


Test Point Placement

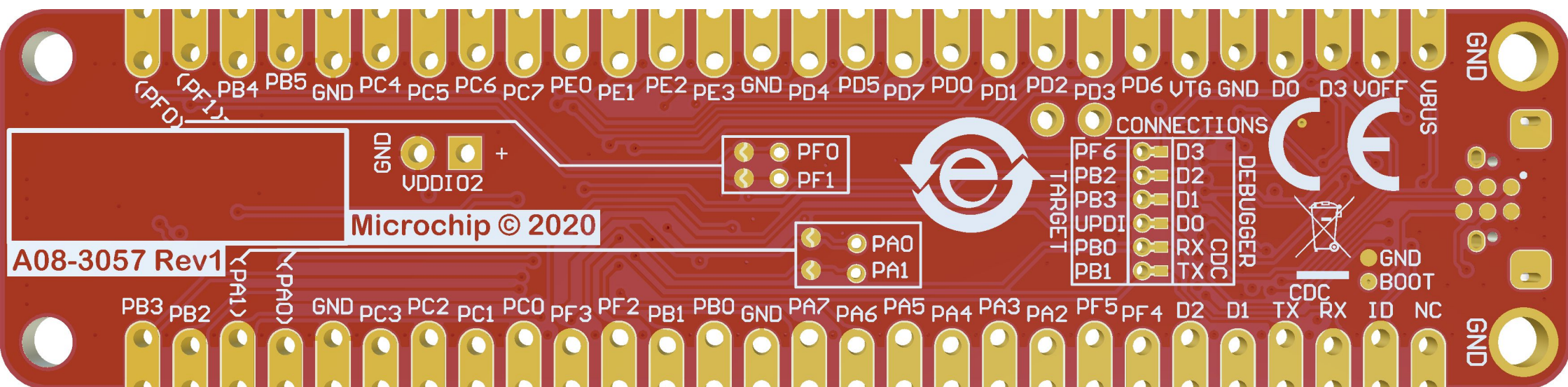


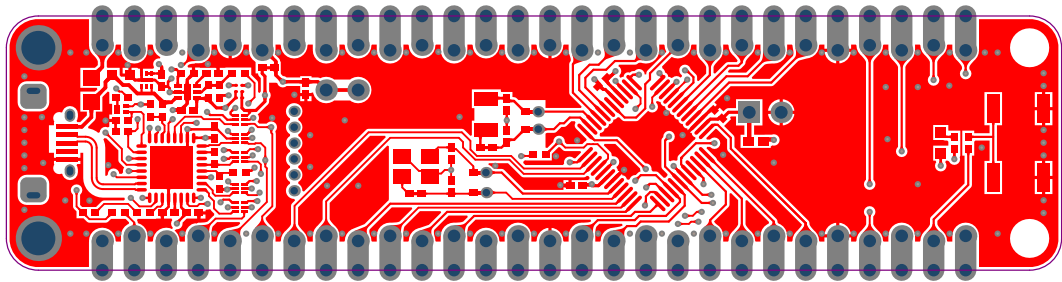


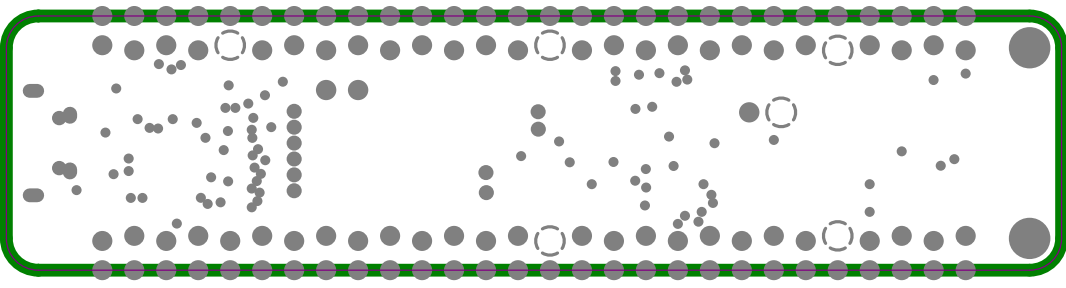


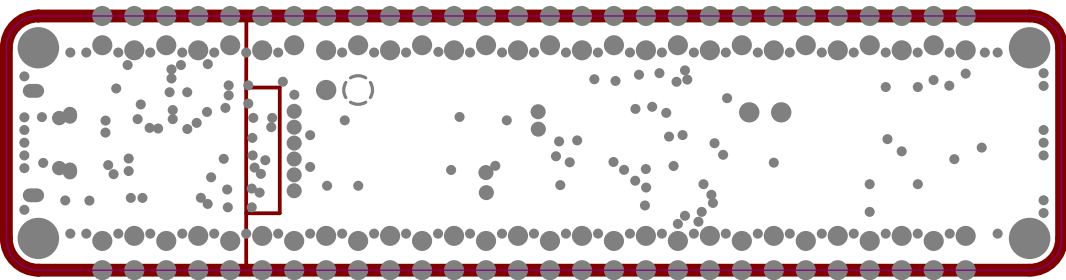


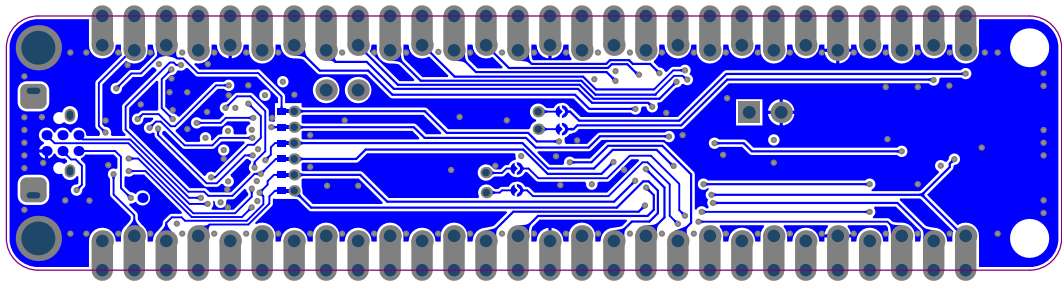
AVR











Component list

Bill of Materials Fitted for Variant [Default Assembly] of Project [AVR128DB48_Curiosity_Nano.PrjPcb] (No PCB Document Selected)

Source Data From: AVR128DB48_Curiosity_Nano.PrjPcb
 Project: AVR128DB48_Curiosity_Nano.PrjPcb
 Variant: Default Assembly



Report Date: 13.08.2020 16:25
 Print Date: 13.08.2020 16:25:42

Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100	1	4.7uF	WALSIN Technology Corporation	0603X475K100CT	Ceramic capacitor, SMD 0603, X5R, 10V, 10% (de31036)
Fitted	C101, C103, C205	3	2.2uF	Kemet, TDK	C0402C225M9PAC, C1005X5R1A225K	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-20%, CAP CER 2.2UF 10V 10% X5R 0402
Fitted	C102, C107, C108, C200, C201, C202	6	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C106	1	1u	Kemet	C0402C105K9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-10% (de26942)
Fitted	C203, C204	2	8.2p	Yageo	CC0402CRNPO9BN8R2	Ceramic capacitor, SMD 0402, NP0, 50V, +/-5%
Fitted	C206, C207	2	15pF	Yageo	CC0402JRNPO9BN150	Ceramic Capacitor, 15pF, 0402, 50V, COG, 5%
Fitted	D100	1	GREEN LED	ROHM	SML-P12MTT86R	LED, SMD 0402, Green, Wave length=569nm, 2.1mcd @ (1mA, 1.9Vf) rohm
Fitted	D200	1	YELLOW LED	ROHM	SML-D12Y1WT86	LED, SMD 0603, Yellow, Wave length=590nm, 100mcd @ (20mA, 2.2Vf) rohm
Fitted	F100	1	MC36213	Multicomp	MC36213	Resetable PTC fuse, Ih = 0.5A, It = 1.0A, 0805 package
Fitted	FW1	1	nEDBG firmw are			nEDBG firmw are
Fitted	J105	1	MU-MB0142AB2-269	Allen Creations Corp.	MU-MB0142AB2-269	USB micro AB, Surface mount signals and DIP shield
Fitted	LABEL1	1	Label PCBA	ACT Logimark AS	505462	PCBA identification label PP Top White Gloss
Fitted	PCB1	1	AVR128DB48 Curiosity Nano PCB Documentation			AVR128DB48 Curiosity Nano PCB Documentation
Fitted	PCBADOc1	1	AVR128DB48 Curiosity Nano PCBA Documentation			AVR128DB48 Curiosity Nano PCBA Documentation
Fitted	Q101	1	DMN65D8LFB	Diodes Incorporated	DMN65D8LFB-7	N-channel MOSFET, DFN1006-3 (SOT883), 60V, 330mA, 40hm
Fitted	R100, R101, R102, R103, R105, R109, R111, R113, R200	9	47k	KOA	RK73H1ETTP4702F	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R104	1	27k	Yageo	RC0402FR-0727KL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R106	1	33k	ASJ Holdings	CR10-3302-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R107, R108, R110, R112, R202, R203	6	1k	ASJ Holdings	CR10-1001-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R204	1	0R	(n/a)	RMCF0402ZTOR00	RES 0.0 OHM 1/16W 0402 SMD
Fitted	SW200	1	TS604VM1-035CR	Dailywell Electronics Co.LTD	TS604VM1-035CR-R	SWITCH, SMD, 260gf, 6.4mm X 6.2mm
Fitted	TEST1	1	AVR128DB48 Curiosity Nano Test			Fixture test for AVR128DB48 Curiosity Nano
Fitted	TESTDOC1	1	Curiosity Nano Test Instructions			Generic Test Instructions for Curiosity Nano
Fitted	U100	1	SAMD21E18A-MUT	Microchip	ATSAMD21E18A-MUT	Atmel 32-bit RISC MCU 32pin
Fitted	U101	1	MC5528-3.3YMT	Microchip	MC5528-3.3YMT-T5	LDO 3.3V 0.5A 6TDFN
Fitted	U102	1	MC5353	Microchip	MC5353YMT-TR	500mA Ultra Low Dropout LDO regulator, 2% accuracy, 1.6x1.6mmMLF
Fitted	U103, U104, U105, U106, U107	5	74LVCI145FW4-7	Diodes Incorporated	74LVCI145FW4-7	Single-Bit Dual-Supply Transceiver, 1.65-5.5 Translation and 3-State Outputs
Fitted	U108	1	MC94163	Microchip	MC94163YCS-TR	Loadswitch, Rds(on) = 14.5mohm, 1.0mm x 1.5mm WLCSP, reverse blocking
Fitted	U200	1	AVR128DB48-IPT	Microchip	AVR128DB48T-IPT	AVR MCU 8-Bit 128kB Flash 48 pin 24MHz TQFP
Fitted	XC200	1	32.768kHz	Microchip	VMK3-9001-32K7680000TR	Crystal, 32.768kHz, CL=9.0pF, ESR=70kOhm, SMD LxW=3.2 x 1.5mm, 20ppm
Fitted	XC201	1	16.000MHz	Microchip	VXM7-9040-16M0000000TR	Crystal, 16.0MHz, CL=12.0pF, ESR=80Ohm, SMD LxW=3.2 x 2.5mm, 20ppm
Not Fitted	J212	0	1125-1102S0S113R1	WCON	1125-1102S0S113R1	1x2 pin header, 2.54mm pitch, Pin-in-Paste THM

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Approved	Notes