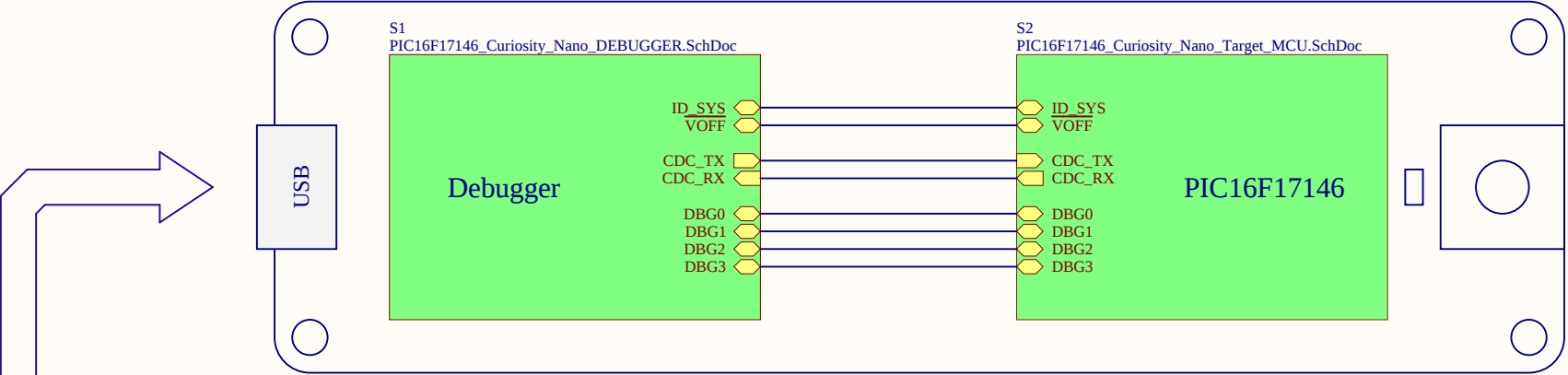
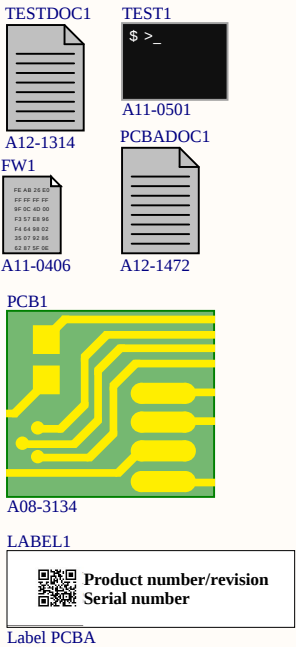
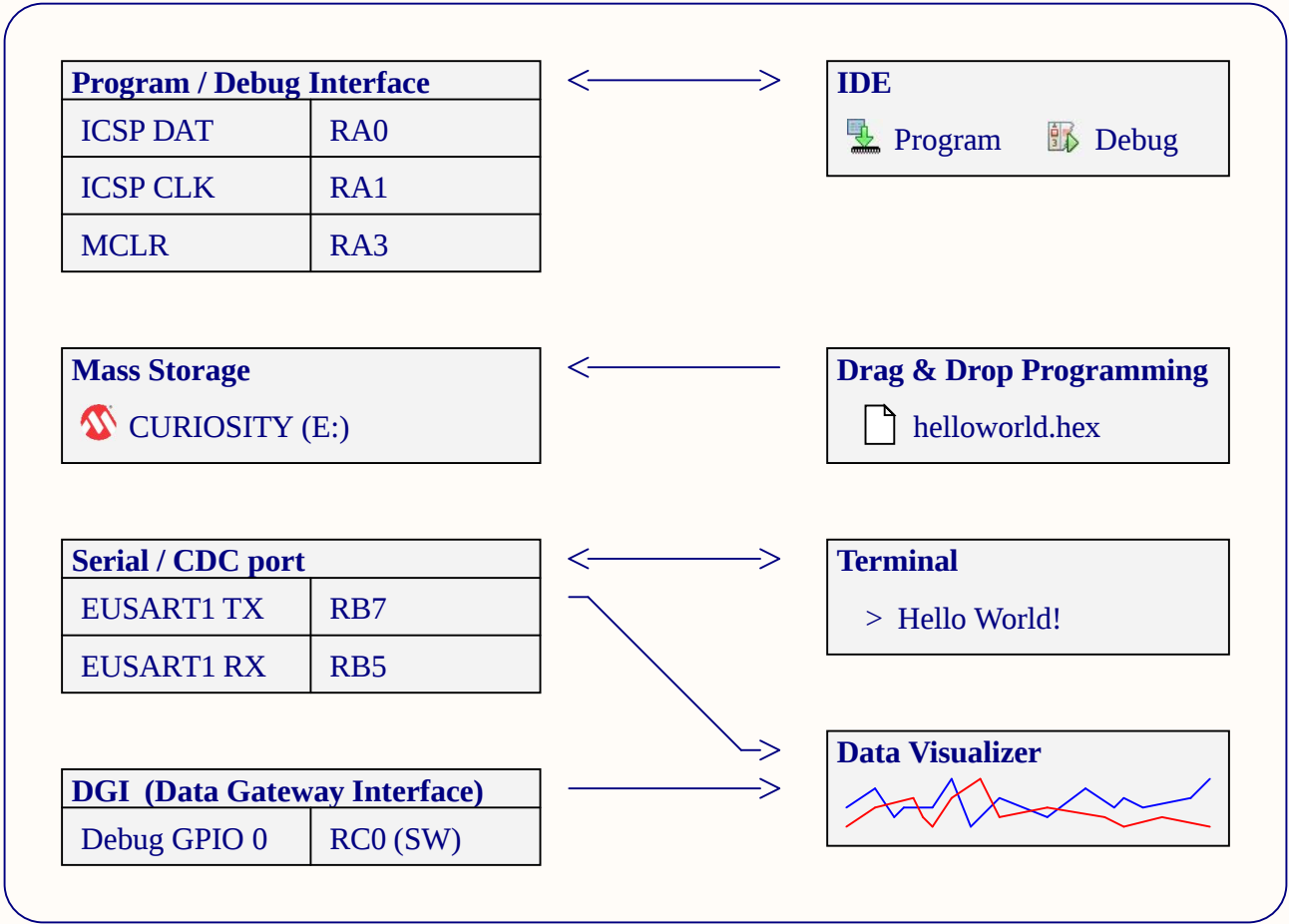


PIC16F17146 Curiosity Nano



On-Board Peripherals		
LED0	RC1	Active Low
SW0	RC0	Active Low



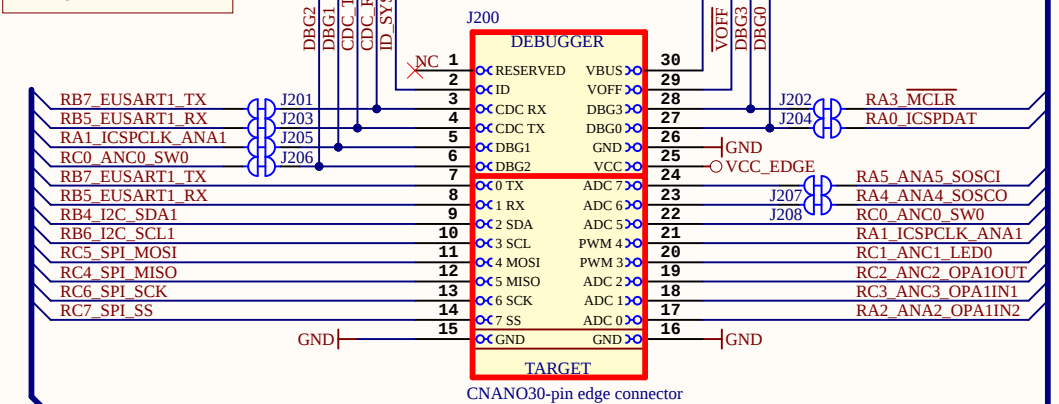
Drawn By: ST		 MICROCHIP	
Engineer: TF			
Project Title PIC16F17146 Curiosity Nano			
Sheet Title Top Level			
Size A3	PCB Assembly Number: A09-3434		PCBA Revision: 4
	PCB Number: A08-3134		PCB Revision: 2
File: PIC16F17146_Curiosity_Nano_TopLevel.SchDoc			Date: 2023-01-24
			Page: 1 of 4

Designed with
Altium
Altium.com

The diagram shows the PIC16F17146-1/6N (U200) with the following connections:

- VCC_TARGET** is connected to pin 20 (RA4/ANA4/SOSCO) and pin 16 (RA0/ICSPDAT).
- GND** is connected to pin 17 (VSS) and pin 21 (PAD).
- RA3_MCLR** is connected to pin 1 (RA3/MCLR/VPP) through a 10k resistor (R200).
- RC5_SPI_MOSI** is connected to pin 2 (RC5).
- RC4_SPI_MISO** is connected to pin 3 (RC4).
- RC3_ANC3_OPA1IN1** is connected to pin 4 (RC3).
- RC6_SPI_SCK** is connected to pin 5 (RC6).
- RA1_ICSPCLK_ANA1** is connected to pin 15 (RA1/ICSPCLK/ANA1).
- RA2_ANA2_OPA1IN2** is connected to pin 14 (RA2/ANA2/OPA1IN2).
- RC0_ANC0_SW0** is connected to pin 13 (RC0).
- RC1_ANC1_LED0** is connected to pin 12 (RC1).
- RC2_ANC2_OPA1OUT** is connected to pin 11 (RC2).
- PAD** is connected to pin 21 (PAD).
- GND** is connected to pin 21 (PAD).

	PIC16F17146	
<i>Debugger</i>	<i>Name</i>	<i>Pin</i>
CDC TX	EUSART1 RX	RB5
CDC RX	EUSART1 TX	RB7
DBG0	ICSPDAT	RA0
DBG1	ICSPCLK	RA1
DBG2	GPIO0	RC0
DBG3	MCLR	RA3
VTG	1.8V - 5.5V	



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.

NOTE on I2C:

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

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

PIC16F17146 datasheet:
Cxin = 5pF (estimate)
Cxout = 5pF (estimate)
Maximum Load = ?
Maximum ESR = ?

Estimated Cpcb = 2pF

Estimated load
C = 2 (Ccrystal- Cpara - Cpcb)
C = 2 (9pF - 2.5pF - 2pF)
C = 9pF

Selected in design after verification
C = 10pF

Drawn By:	ST
Engineer:	TF

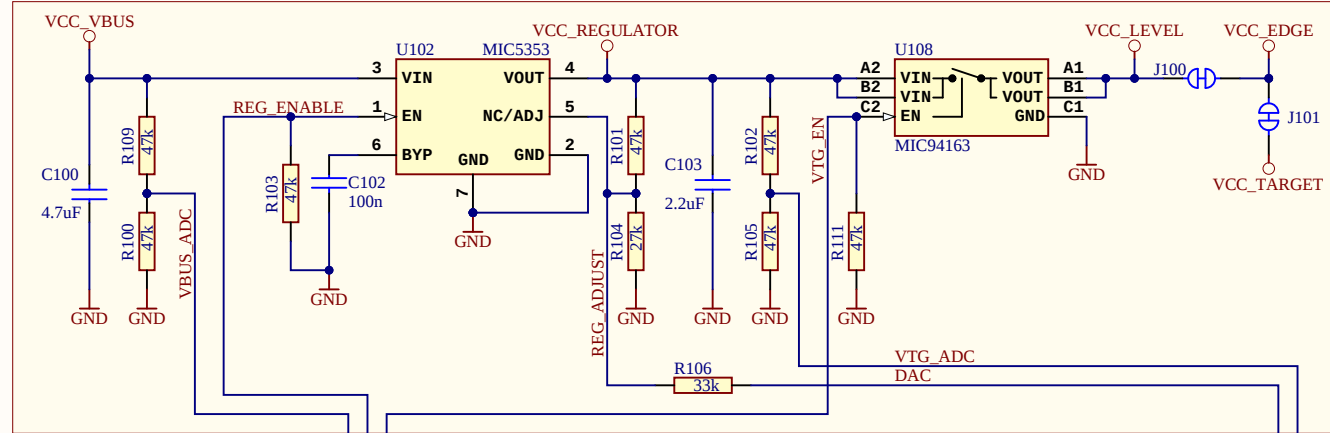


Project Title	PIC16F17146 Curiosity Nano
Sheet Title	Target MCU

Designed with
Altium
Altium.com

Size A3	PCB Assembly Number: A09-3434	PCBA Revision: 4	Date: 2023-01-24
	PCB Number: A08-3134	PCB Revision: 2	
File: PIC16F17146_Curiosity_Nano_Target_MCU.SchDoc			Page: 2 of 4

TARGET ADJUSTABLE REGULATOR



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.
 ($V_{max} = V_{in} - \text{dropout}$)

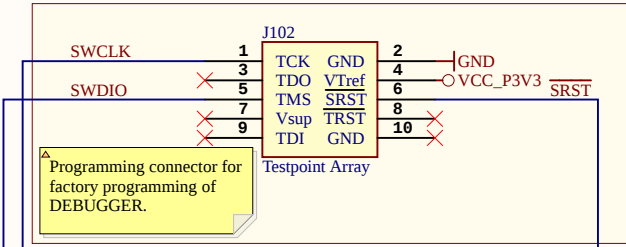
Interface	ICSP TARGET	UPDI TARGET
CDC TX	UART RX	UART RX
CDC RX	UART TX	UART TX
DBG0	DAT	UPDI
DBG1	CLK	GPIO
DBG2	GPIO	GPIO
DBG3	MCLR	RESET
VCC	-	-

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

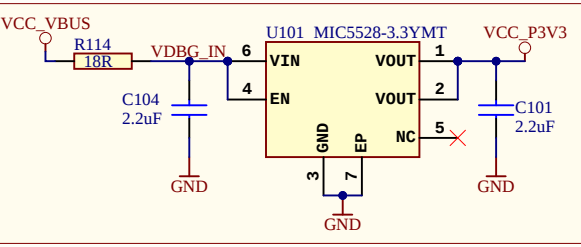
Adjustable output and limitations:

- 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 volatage 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 the target specification.

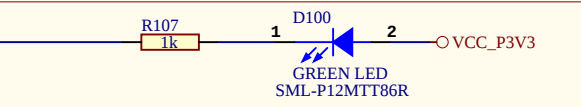
DEBUGGER TESTPOINT



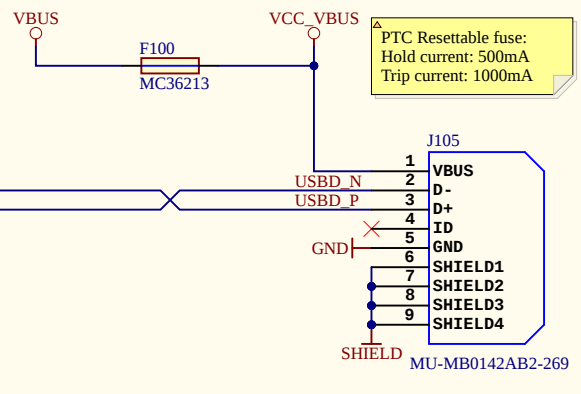
DEBUGGER REGULATOR



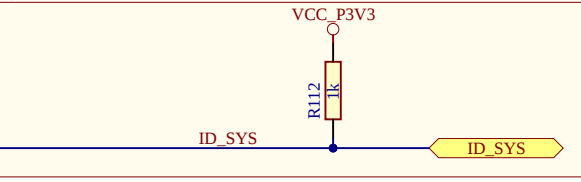
DEBUGGER POWER/STATUS LED



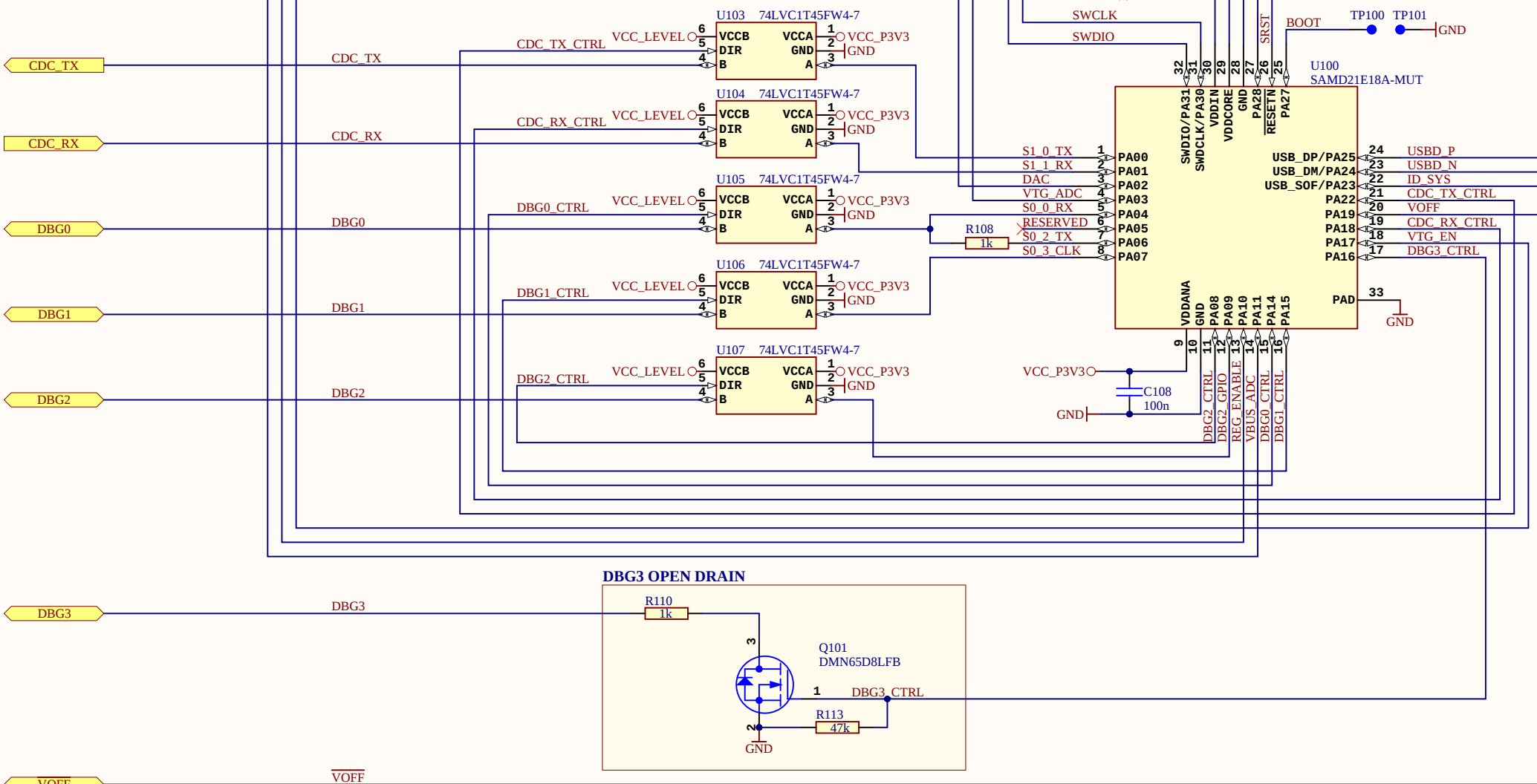
DEBUGGER USB MICRO-B CONNECTOR



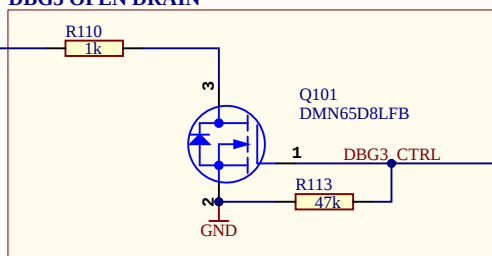
ID PIN



DEBUGGER



DBG3 OPEN DRAIN



Revision History

PCB Assembly Rev 1:

Design Changes:

Initial Design

PCB:

PCB revision 1

PCB Assembly Rev 2:

Design Changes:

* PIC16F17146 silicon revision B0 is mounted on the board
* Addes series resistor for U101

PCB:

* PCB revision 2

PCB Assembly Rev 3:

Design Changes:

* PIC16F17146 silicon revision B0 is mounted on the board
* 32.768kHz crystal load capacitors changed from 5pF to 10pF

PCB:

* PCB revision 2

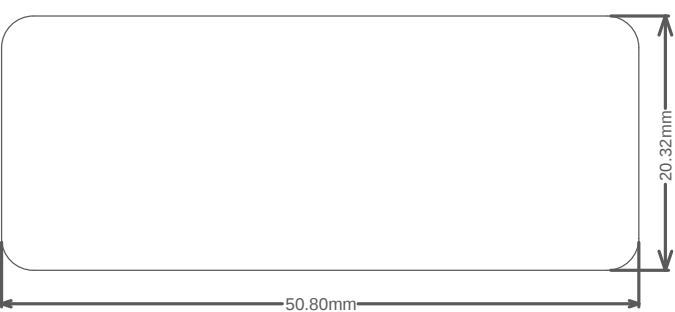
PCB Assembly Rev 4:

Design Changes:

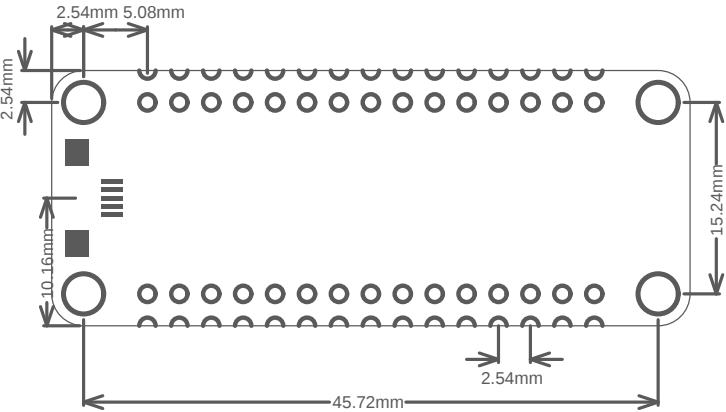
* PIC16F17146 silicon revision B2 or later is mounted on the board

PCB:

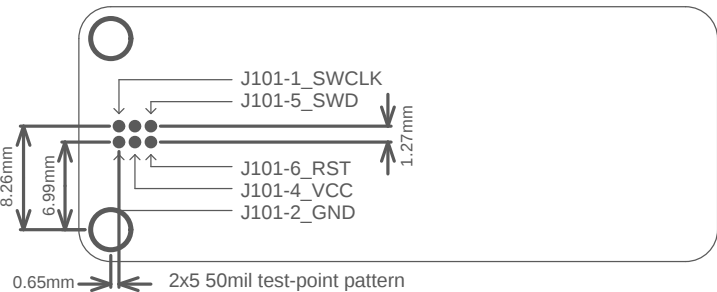
* PCB revision 2

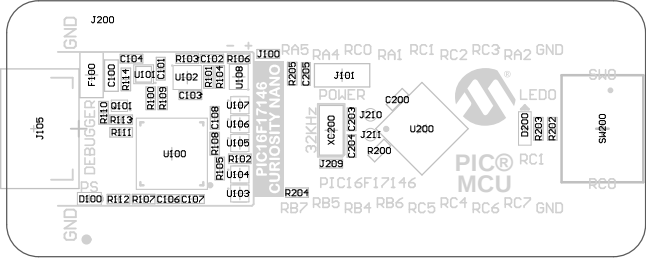


Connector Placement



Test Point Placement





GND RA2 RC3 RC2 RC1 RA1 RC0 RA4 RA5 V_{TT} GND D0 D3 V_{OFF} V_{BUS}

Microchip © 2021

LABEL1

A08-3134 Rev2

RA4 J208
RA5 J207



TARGET

RA3	J202	D3
RC0	J206	D2
RA1	J205	D1
RA0	J204	D0
RB7	J201	RX
RB5	J203	TX

DEBUGGER

CDC

4

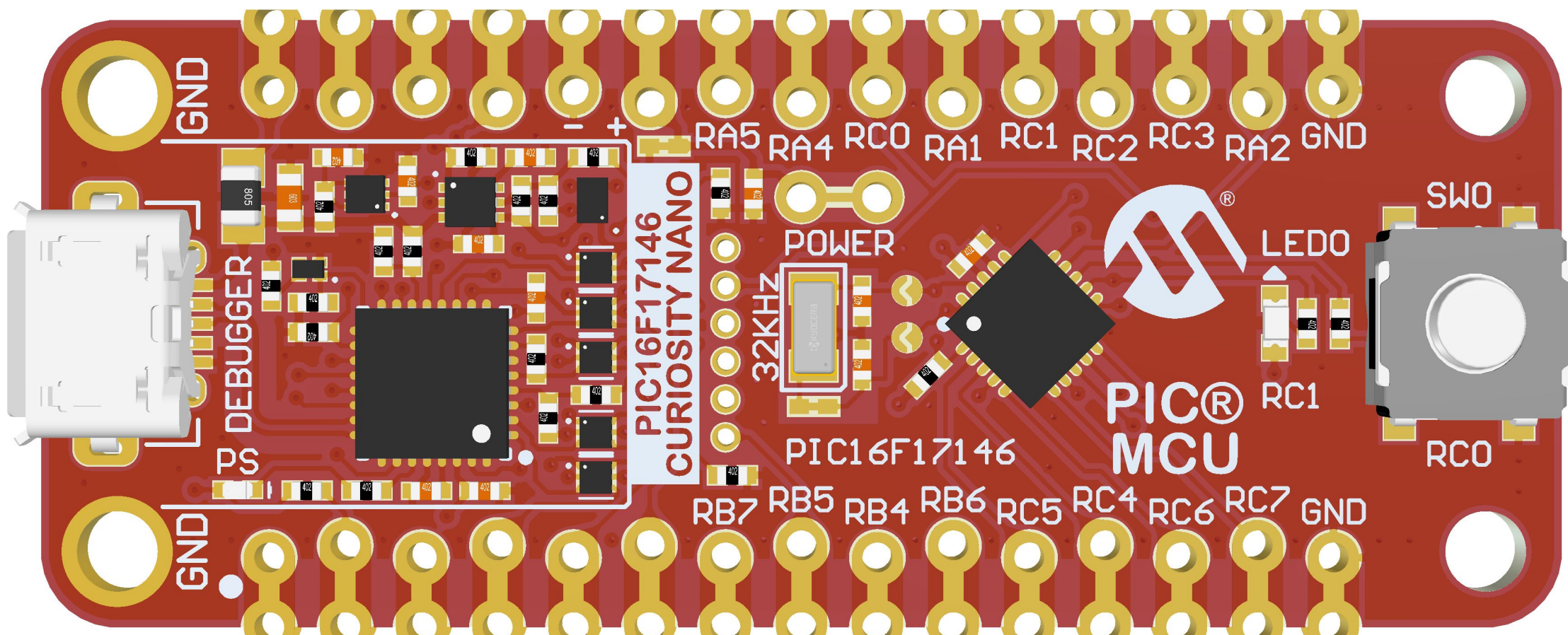
TP101 GND
TP100 BOOT

GND RC7 RC6 RC4 RC5 RB6 RB4 RB5 RB7 D2 D1 TX RX ID NC

GND

J102

GND



Microchip © 2021

A08-3134 Rev2

GND RA2 RC3 RC2 RC1 RA1 RC0 RA4 RA5 V_{TTG} GND D0 D3 V_{OFF} U_{BUS}

GND

CONNECTIONS

RA4
RA5

TARGET



RA3	D3
RC0	D2
RA1	D1
RA0	D0
RB7	RX
RB5	TX

DEBUGGER

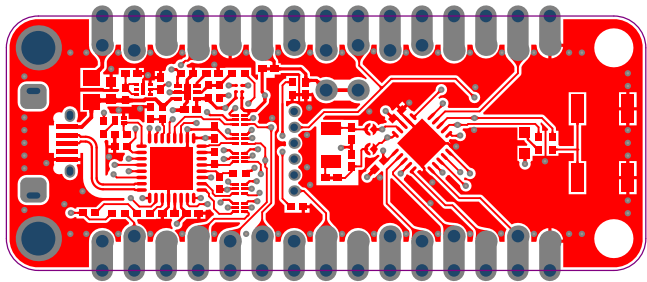
CDC

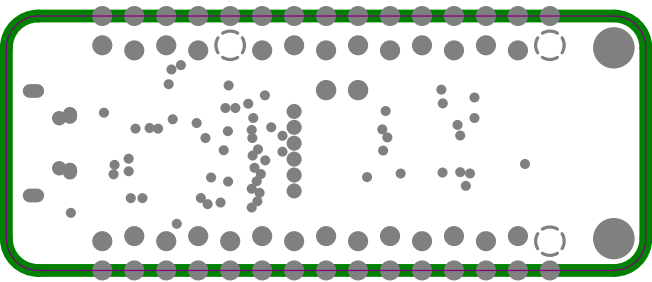


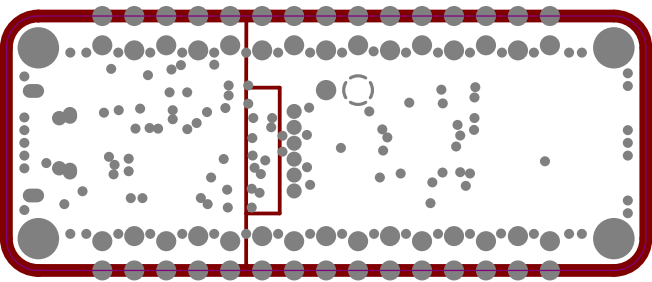
GND
BOOT

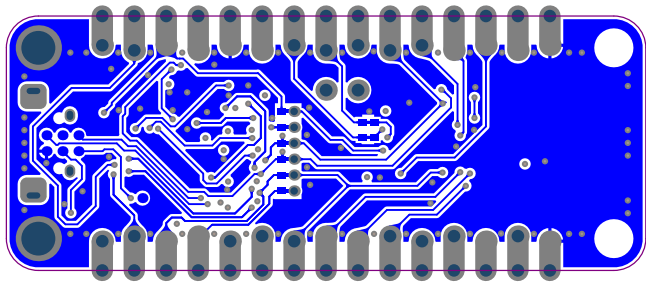
GND RC7 RC6 RC4 RC5 RB6 RB4 RB5 RB7 D2 D1 TX RX ID NC

GND









Component list

Bill of Materials Fitted for Variant [Default Assembly] of Project [PIC16F17146_Curiosity_Nano.PrjPcb] (No PCB Document Selected)

Source Data From: PIC16F17146_Curiosity_Nano.PrjPcb
Project: PIC16F17146_Curiosity_Nano.PrjPcb
Variant: Default Assembly



Report Date: 2023-01-24 12:10
Print Date: 2023-01-24 12:07:44

Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100	1	4.7uF	Yageo	CO0603KRX5R6BB475	Ceramic capacitor, SMD 0603, X5R, 10V, 10% (de31036)
Fitted	C101, C103, C104, C205	4	2.2uF	TDK	C1005X5R1A225K050BC	CAP CER 2.2UF 10V 10% X5R 0402
Fitted	C102, C107, C108, C200	4	100n	Kemet	C0402C104K4RACU	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	10pF	Yageo	CO0402JRNPO9BN100	Ceramic capacitor, SMD 0402, NP0, 50V, +/-5% (de16674)
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	PIC16F17146 Curiosity Nano PCB Documentation			PIC16F17146 Curiosity Nano PCB Documentation
Fitted	PCBDOC1	1	PIC16F17146 Curiosity Nano PCBA Documentation			PIC16F17146 Curiosity Nano PCBA Documentation
Fitted	Q101	1	DMN65D8LFB	Diodes Incorporated	DMN65D8LFB-7	N-channel MOSFET, DFN1006-3 (SOT883), 60V, 330mA, 4Ohm
Fitted	R100, R101, R102, R103, R105, R109, R111, R113, R204, R205	10	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	Yageo	RC0402FR-0733KL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R107, R108, R110, R112, R202, R203	6	1k	Yageo	RC0402FR071KL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R114	1	18R	Yageo	RC0402FR-0718RL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R200	1	10k	Yageo	RC0402FR-0710KL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	SW200	1	TS604VM1-035CR	Dailyw ell Electronics Co.LTD	TS604VM1-035CR-R	SWITCH, SMD, 260gf, 6.4mm X 6.2mm
Fitted	TEST1	1	PIC16F17146 Curiosity Nano Test			Fixture Test for PIC16F17146 Curiosity Nano
Fitted	TESTDOC1	1	Curiosity Nano Test Instructions			Generic Test Instructions for Curiosity Nano
Fitted	U100	1	SAMD21E18A-MUT	Microchip	ATSAMD21E18A-MUT	32-bit RISC MCU 32pin
Fitted	U101	1	MIC5528-3.3YMT	Microchip	MIC5528-3.3YMT-T5	LDO 3.3V 0.5A 6TDFN
Fitted	U102	1	MIC5353	Microchip	MIC5353YMT-TR	500mA Ultra Low Dropout LDO regulator, 2% accuracy, 1.6x1.6mm MLF
Fitted	U103, U104, U105, U106, U107	5	74LVC1T45FW4-7	Diodes Incorporated	74LVC1T45FW4-7	Single-Bit Dual-Supply Transceiver, 1.65-5.5 Translation and 3-State Outputs
Fitted	U108	1	MIC94163	Microchip	MIC94163YCS-TR	Loadswitch, Rds(on) = 14.5mohm, 1.0mm x 1.5mm WLCSP, reverse blocking
Fitted	U200	1	PIC16F17146-V6N	Microchip	PIC16F17146-V6N	PIC 8-bit RISC MCU, VQFN-20, 4mm x 4mm
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

	55	
Approved	Notes	