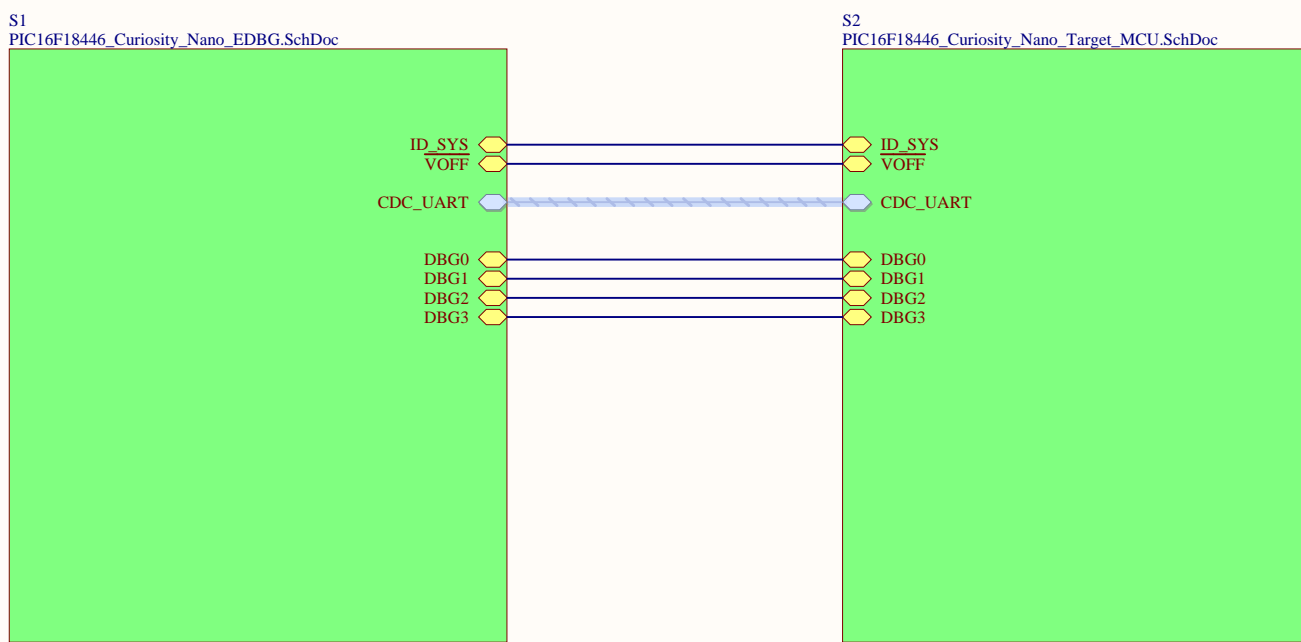




PIC16F18446 Curiosity Nano







TESTDOC1




TEST1




A12-1314




FW1




A11-0410



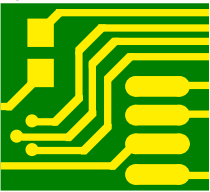
PCBADOC1




A11-0406




A12-1313




PCB1



A08-2863

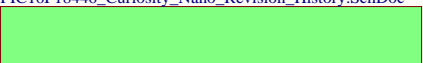


LABEL1

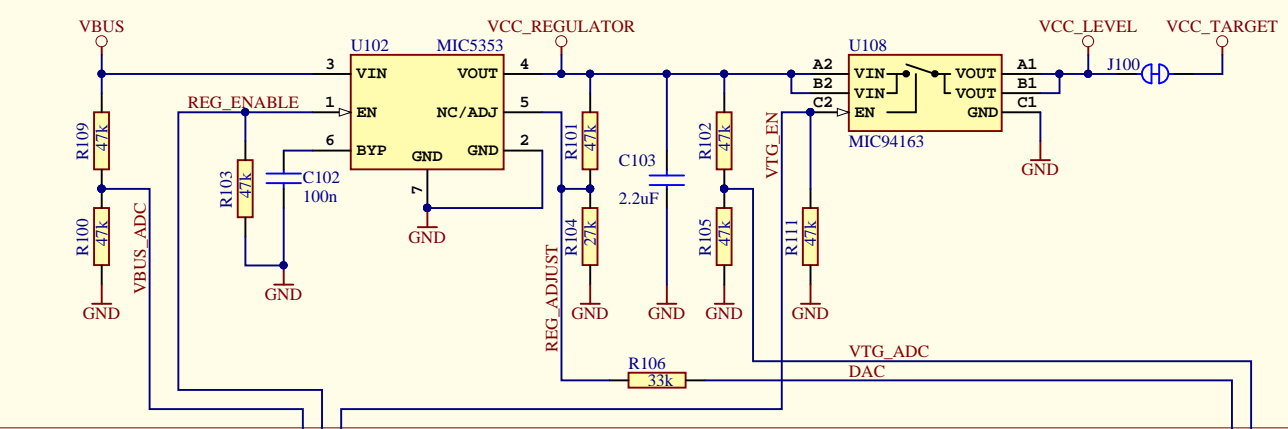


Label PCBA

S3
PIC16F18446_Curiosity_Nano_Revision_History.SchDoc



TARGET ADJUSTABLE REGULATOR



Adjustable output and limitations:

- The nEDBG can adjust the output voltage of the regulator between 1.25V and 5.1V to the target.
- 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 output switch 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 target specification.
- Firmware feedback loop will adjust the output voltage accuracy to within 0.5%.

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

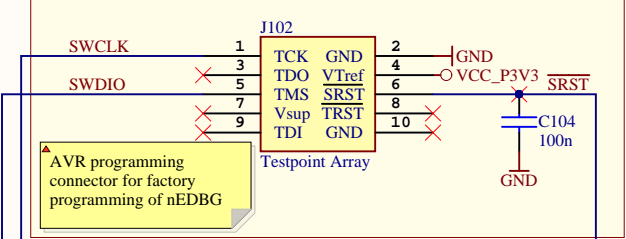
Maximum output voltage is limited by the input voltage and the dropout voltage in the regulator.
(Vmax = Vin - dropout)

Interface Signal	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	-	-

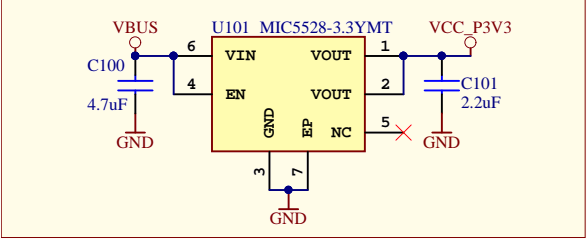
MIC5528:

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

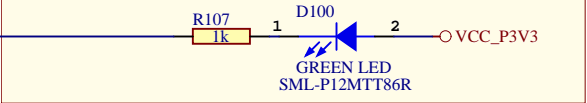
nEDBG TESTPOINT



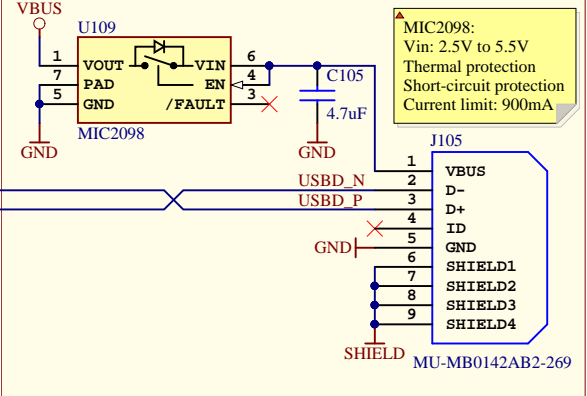
nEDBG REGULATOR



nEDBG POWER/STATUS LED



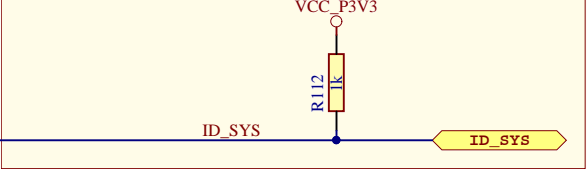
nEDBG USB MICRO-B CONNECTOR



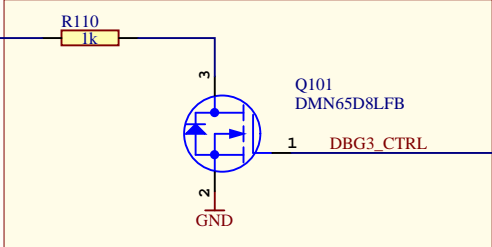
MIC2098:

Vin: 2.5V to 5.5V
Thermal protection
Short-circuit protection
Current limit: 900mA

ID PIN



DBG3 OPEN DRAIN



Drawn By:
Microchip Norway
Engineer:
HN

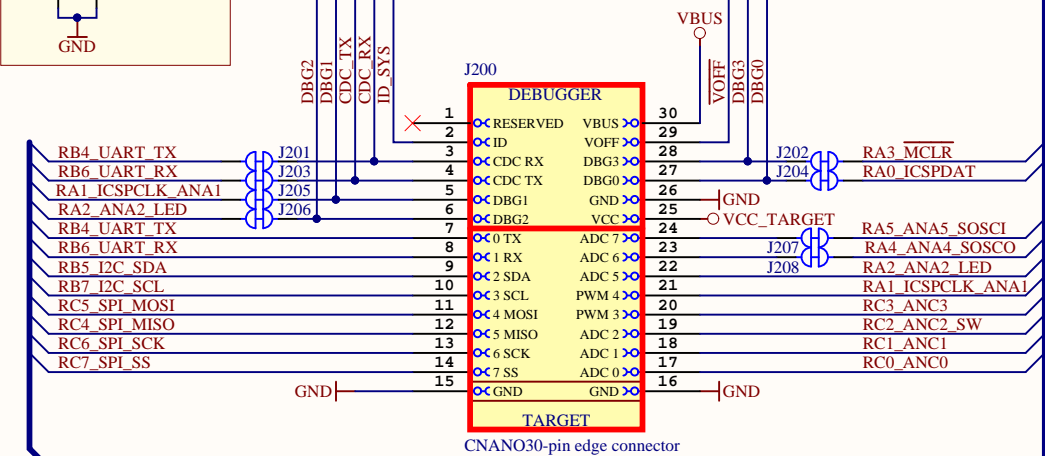
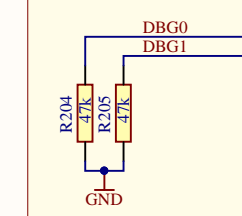
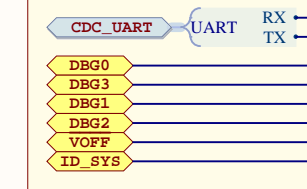
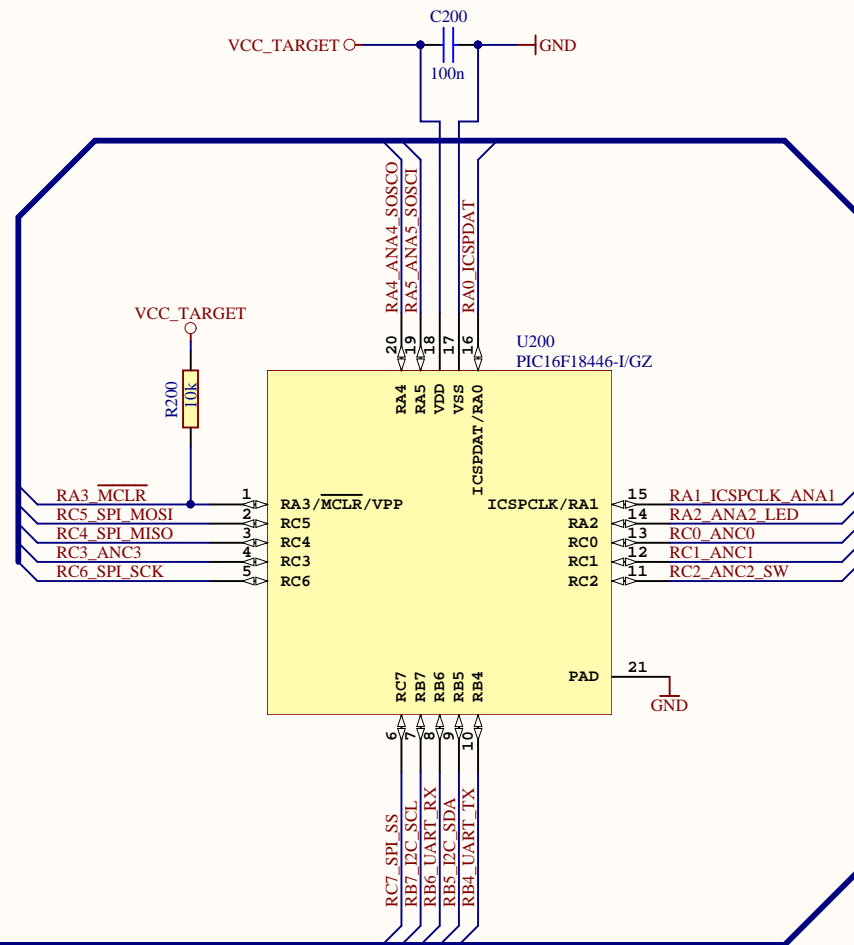


Project Title
PIC16F18446 Curiosity Nano
Sheet Title
Debugger

Size A3	PCB Assembly Number: A09-3120	PCBA Revision: 5
PCB Number: A08-2863	PCB Revision: 4	Date: 30.10.2018
File: PIC16F18446_Curiosity_Nano_EDBG.SchDoc		Page: 2 of 4

Designed with
Altium
Altium.com

PIC16F18446



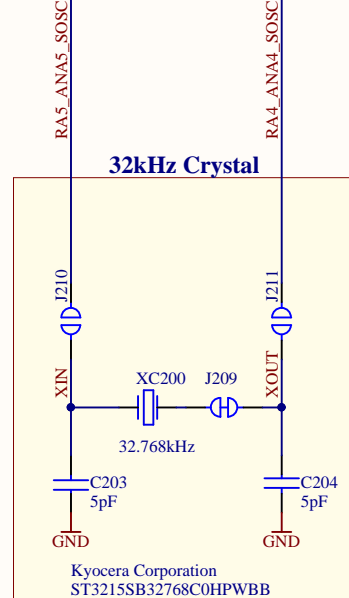
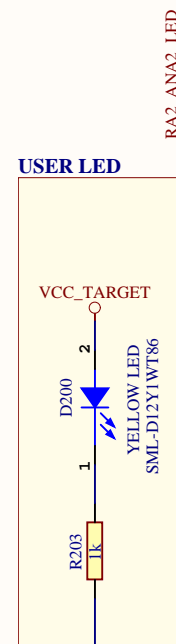
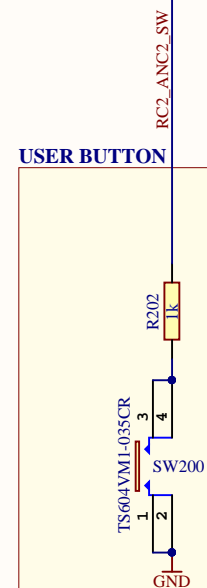
▲ NOTE on UART/CDC:

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

CDC TX is output from the nEDBG.
CDC RX is input to the nEDBG.
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 slave device(s).



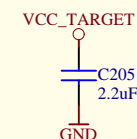
Crystal datasheet:
Ccrystal = 7pF
max ESR = 70kOhm
Accuracy $\pm 20\text{ppm}$

PIC16F18446 datasheet:
C_{xin} = 5pF (estimate)
C_{xout} = 5pf (estimate)
Maximum Load = ?
Maximum FSR = ?

Estimated Cpcb = 2pF

Estimated load
 $C = 2 (C_{\text{crystal}} - C_{\text{para}} - C_{\text{pcb}})$
 $C = 2 (7\text{pF} - 2.5\text{pF} - 2\text{pF})$
 $C = 5\text{pF}$

Selected in design
 $C = 5\text{pF}$



Drawn By:	Microchip Norway
Engineer:	HN



Project Title	PIC16F18446 Curiosity Nano
Sheet Title	Target MCU

Designed with
Altium
Altium.com

Size A3	PCB Assembly Number: A09-3120	PCBA Revision: 5	Altium.com
	PCB Number: A08-2863	PCB Revision: 4	
File: PIC16F18446_Curiosity_Nano_Target_MCU.SchDoc			Page: 3 of 4

Revision History

PCB Assembly Rev 1:

Design Changes:

Initial Design
U200, PIC16F18446-I/GZ are engineering samples

PCB:

PCB revision 1

PCB Assembly Rev 2:

Design Changes:

Replaced Crystal XC200 with a 7pF variant.
Replaced C203 & C204 with 5pF Capacitors.
U200, PIC16F18446-I/GZ are RTP samples

PCB:

PCB Revision 1. no change

PCB Assembly Rev 3:

Design Changes:

Added reverse blocking switch (U108)
Added ID_SYS pin
Added VOFF pin
Changed 10uF to 4.7uF (C100)

PCB:

PCB Revision 2
Increased board size for ID and VOFF pin
Rerouted for target voltage blocking switch

PCB Assembly Rev 4:

Design Changes:

Added USB VBUS protection (U109)
Added VBUS pin

PCB:

PCB Revision 3
Increased board size for VBUS pin
Reroute the debugger section for the VBUS pin


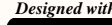
PCB Assembly Rev 5:

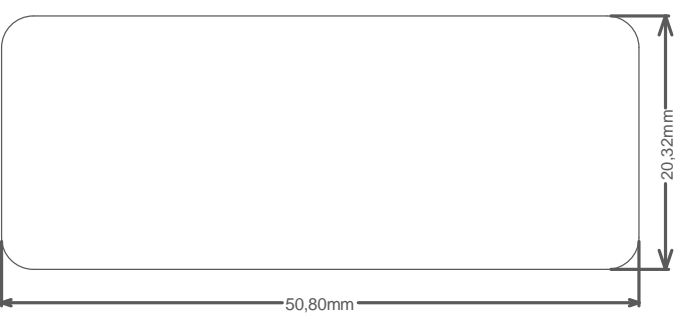
Design Changes:

Added input cap on VBUS (U109)

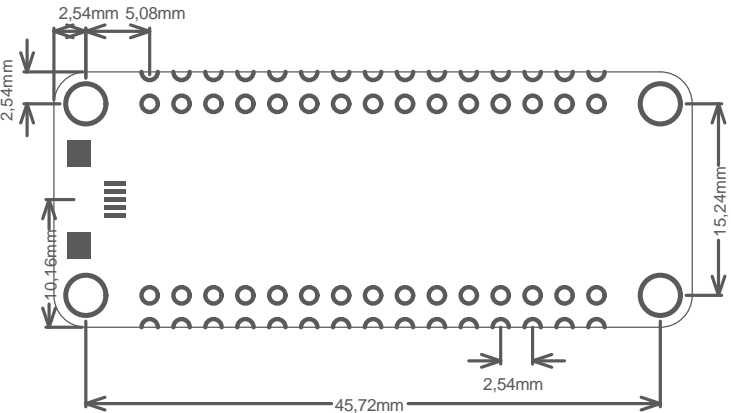
PCB:

PCB Revision 4
Added input cap on U109

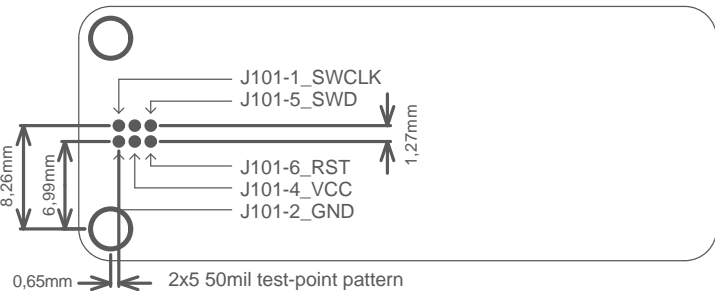
Drawn By: Microchip Norway		 MICROCHIP		
Engineer: HN				
Project Title PIC16F18446 Curiosity Nano				<i>Designed with</i>  Altium.com
Sheet Title Revision History				
Size A3	PCB Assembly Number: A09-3120		PCBA Revision: 5	
	PCB Number: A08-2863		PCB Revision: 4	Date: 30.10.2018
File: PIC16F18446_Curiosity_Nano_Revision_History.SchDoc				Page: 4 of 4

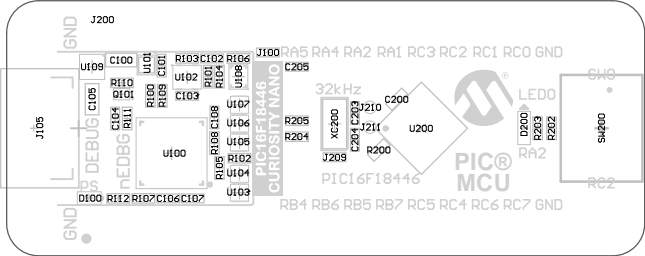


Connector Placement



Test Point Placement





GND RC0 RC1 RC2 RC3 RA1 RA2 RA4 RA5 VTG GND D0 D3 VOFF UBUS

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LABEL1

A08-2863 Rev4

RA4 J208
RA5 J207

TARGET

CONNECTIONS

RA3	J202	D3
RA2	J206	D2
RA1	J205	D1
RA0	J204	D0
RB4	J201	RX CDC
RB6	J203	TX CDC

NEDBG

Ct

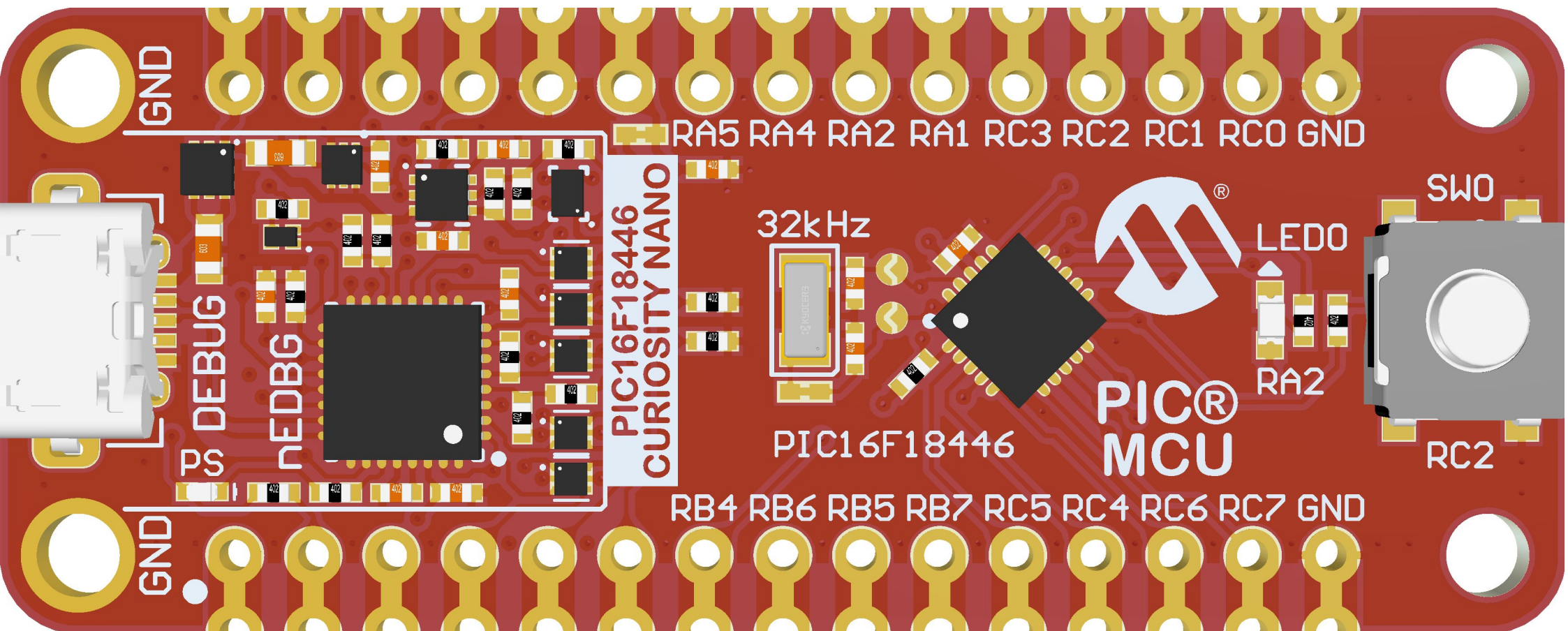
TP101 GND
TP100 BOOT

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

GND

J102

GND



GND

RA5 RA4 RA2 RA1 RC3 RC2 RC1 RC0 GND

SW0

LED0

RA2

RC2

RB4 RB6 RB5 RB7 RC5 RC4 RC6 RC7 GND

GND

PS DEBUG

NEDBG

PIC16F18446
CURIOSITY NANO

32kHz

PIC16F18446

PIC®
MCU

GND RC0 RC1 RC2 RC3 RA1 RA2 RA4 RA5 VTG GND D0 D3 VOFF UBUS

Microchip © 2018

CONNECTIONS

RA4
RA5

TARGET

RA3		D3	
RA2		D2	
RA1		D1	
RA0		D0	
RB4		RX	CDC
RB6		TX	

NEDBG



GND
BOOT

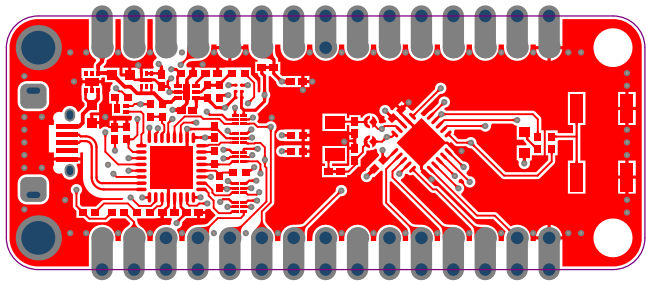
CDC

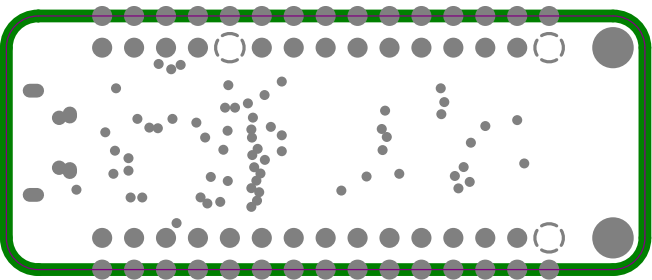
GND RC7 RC6 RC4 RC5 RB7 RB5 RB6 RB4 D2 D1 TX RX ID NC

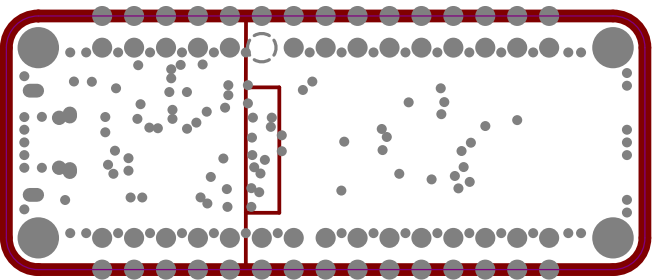
GND

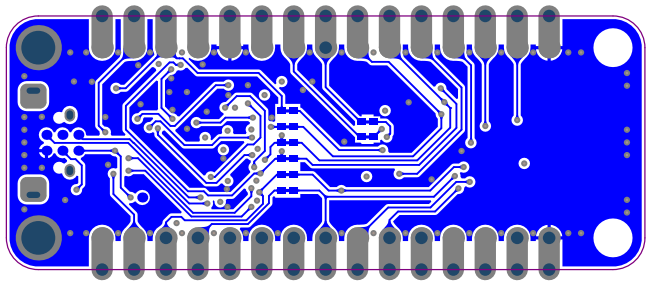
GND

A08-2863 Rev4









Component list

Bill of Materials Fitted For Variant [Default Assembly] of Project [PIC16F18446_Curiosity_Nano.PrjPcb] (No PCB Document Selected)

Source Data From: PIC16F18446_Curiosity_Nano.PrjPcb
Project: PIC16F18446_Curiosity_Nano.PrjPcb
Variant: Default Assembly

Report Date: 30.10.2018 12:19:32
Print Date: 30.10.2018 12:16:51



Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100, C105	2	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, C104, C107, C108, C200	5	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	5pF	Murata	GRM1555C1H5R0CA01D	Ceramic capacitor, SMD 0402, NP0 (C0G), 50V, +/-0.25pF
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	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	PIC16F18446 Curiosity Nano PCB documentation			PIC16F18446 Curiosity Nano PCB documentation
Fitted	PCBDOC1	1	A09-3120 PCBA files			PIC16F18446 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, R204, R205	9	47k	KOA	RK73H1ETTP4702F	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R104	1	27k	YAGEO CORP	RC0402FR-0727KL	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R106	1	33k	ASJ	CR10-3302-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R107, R108, R110, R112, R202, R203	6	1k	ASJ	CR10-1001-FK	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R200	1	10k	YAGEO CORP	RC0402FR-0710KL	Thick film resistror, SMD 0402, 1/16W, 1%
Fitted	SW200	1	TS604VM1-035CR	Dailywell Electronics Co.LTD	TS604VM1-035CR-R	SWITCH, SMD, 260gf, 6.4mm X 6.2mm
Fitted	TEST1	1	PIC16F18446 Curiosity Nano test			Fixture test for PIC16F18446 Curiosity Nano
Fitted	TESTDOC1	1	Curiosity Nano Test Instructions			PIC16F18446 Curiosity Nano Test Instructions
Fitted	U100	1	SAMD21E18A-MUT	Microchip	ATSAMD21E18A-MUT	Atmel 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 Technology Inc	MIC94163Y CS-TR	Loadswitch, Rds(on) = 14.5mohm, 1.0mm x 1.5mm WLCSP, reverse blocking
Fitted	U109	1	MIC2098	Microchip	MIC2098-1YMT	900mA current limiting power distribution switch, active high
Fitted	U200	1	PIC16F18446-IGZ	Microchip Technology Inc	PIC16F18446T-IGZ	PIC 8-bit RISC MCU, UQFN-20, 4mm x 4mm
Fitted	XC200	1	32.768kHz	Kyocera Corporation	ST3215SB32768C0HPWBB	Kyocera ST3215SB32768C0HPWBB, 32.768kHz, 7pF, SMD tuning fork crystal

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Approved Notes