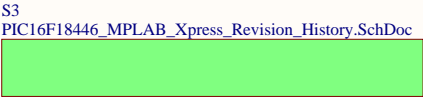
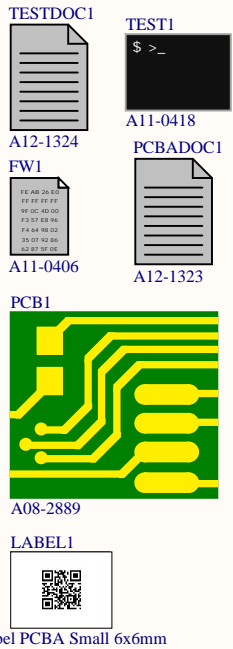
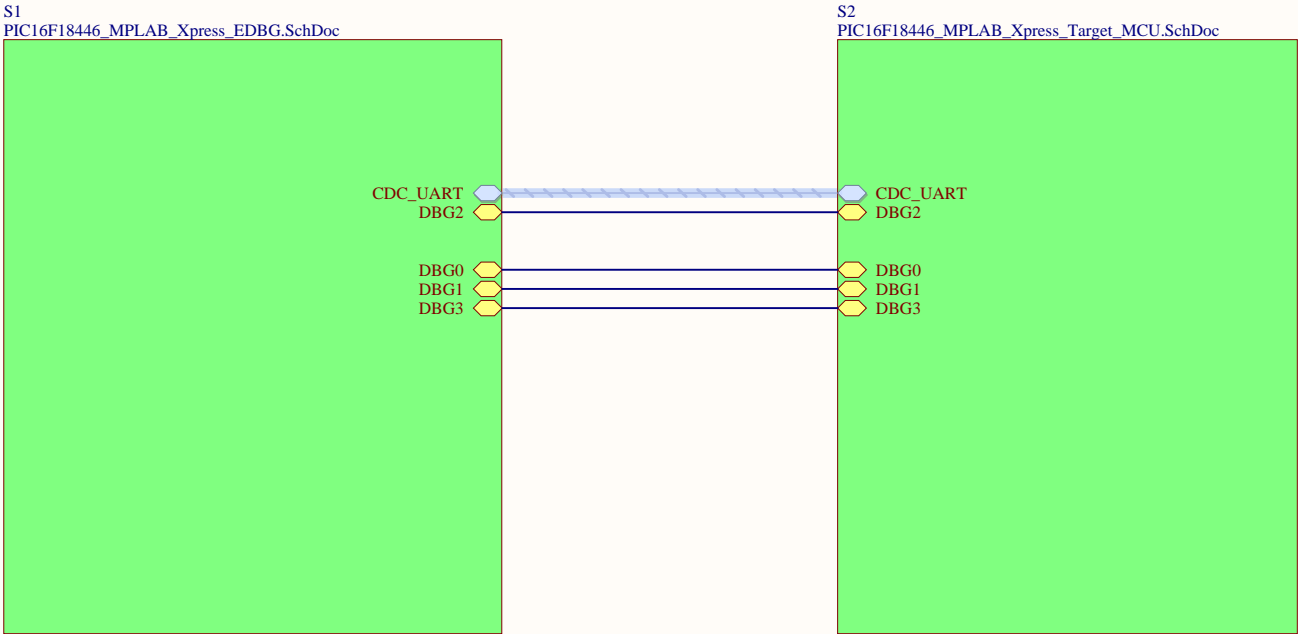


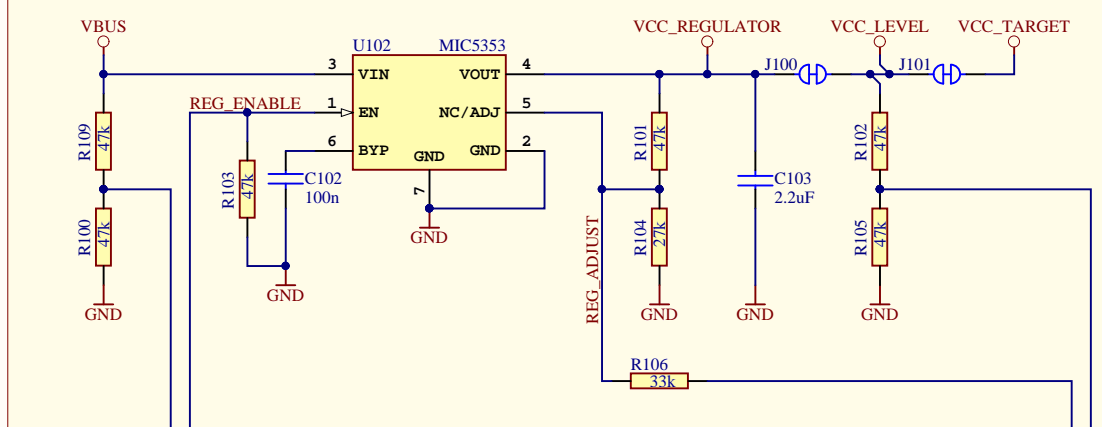


MPLAB® Xpress PIC16F18446



Drawn By: Microchip Norway		 MICROCHIP		
Engineer: HN				
Project Title MPLAB® Xpress PIC16F18446				<i>Designed with</i>  Altium.com
Sheet Title Top Level				
Size A3	PCB Assembly Number: A09-3160		PCBA Revision: 1	
	PCB Number: A08-2889		PCB Revision: 1	Date: 16.01.2018
File: PIC16F18446_MPLAB_Xpress_TopLevel.SchDoc				Page: 1 of 4

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 voltage allowed 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 to separate the onboard regulator from the VCC_LEVEL and VCC_TARGET. Cut this strap if external voltage supply is used, while still keeping the debugger and DGI interface.

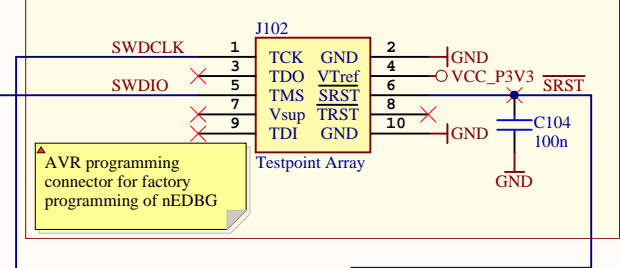
J101:
Cut-strap used for current measurement or for full separation of target from nEDBG and power.

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

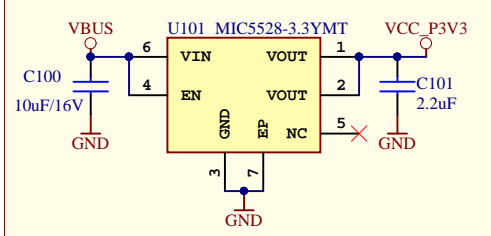
Maximum output voltage is limited by the input voltage and the dropout voltage in the regulator.
(Vmax = Vin - dropout)

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

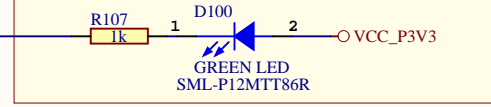
nEDBG TESTPOINT



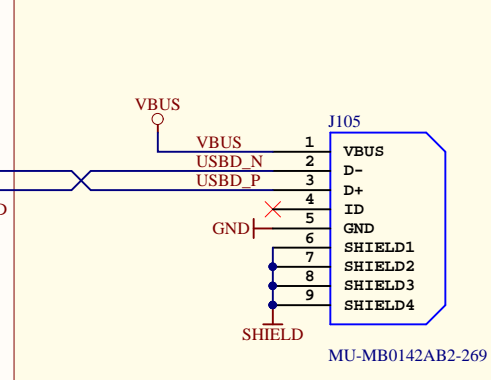
nEDBG REGULATOR



nEDBG POWER/STATUS LED



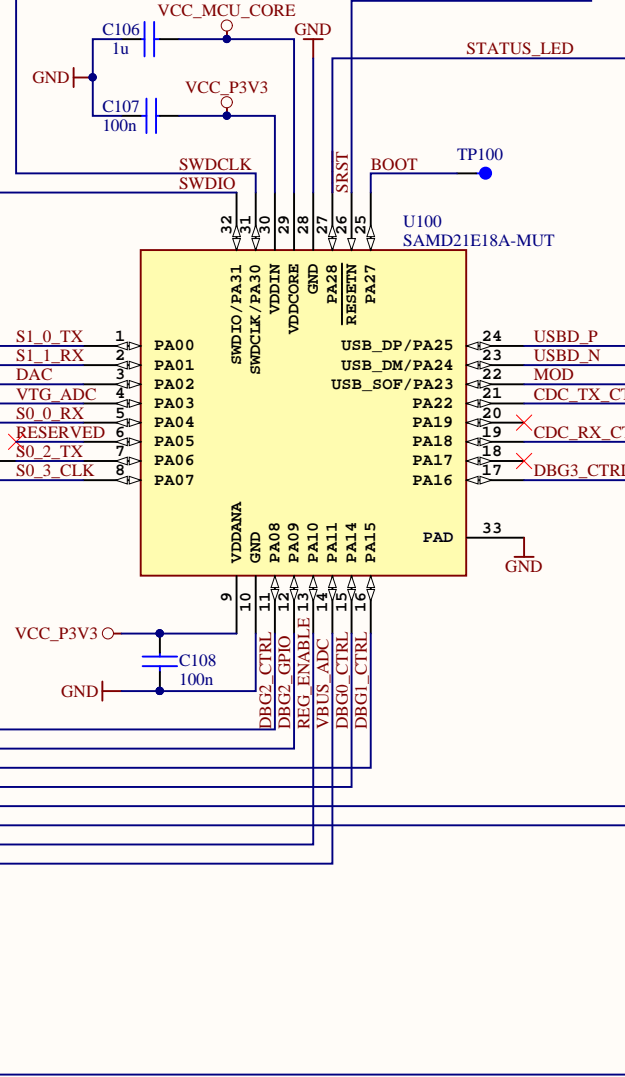
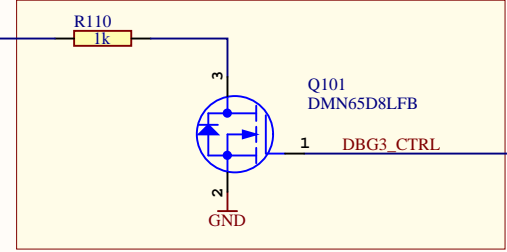
nEDBG USB MICRO-B CONNECTOR



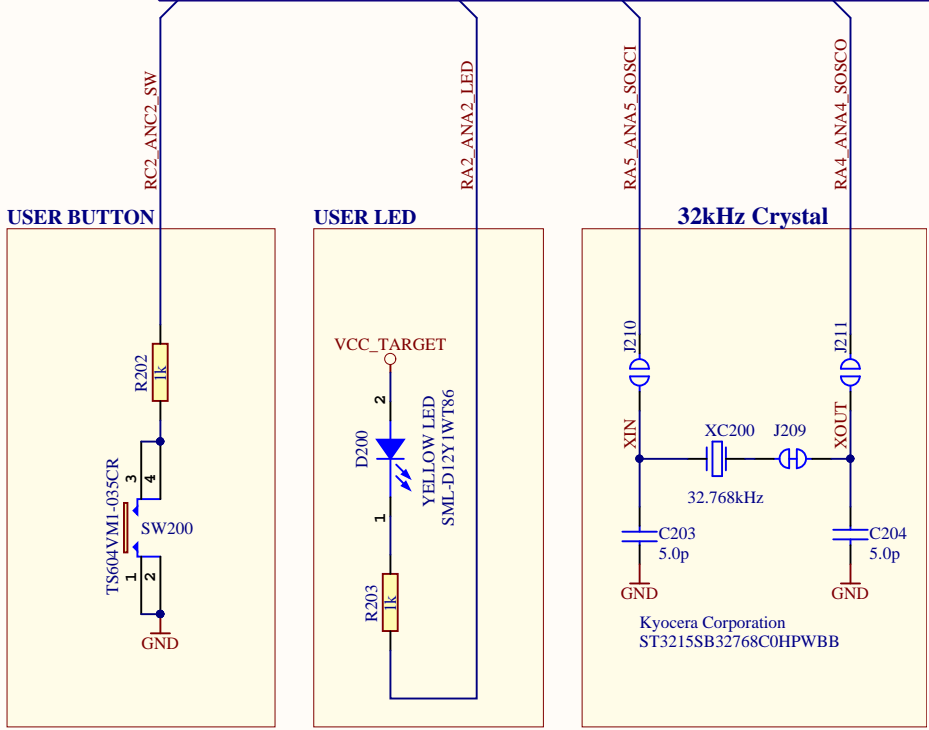
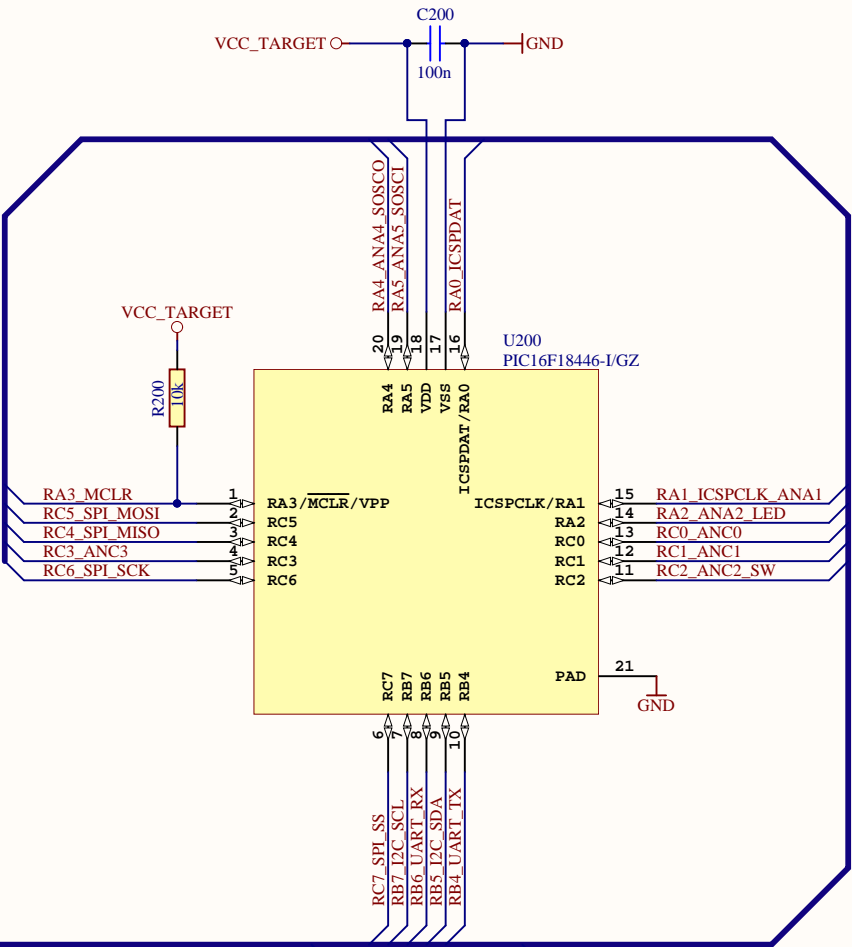
Interface	ICSP TARGET
CDC TX	UART RX
CDC RX	UART TX
DBG0	DAT
DBG1	CLK
DBG2	GPIO
DBG3	MCLR
VCC	-



DBG3 OPEN DRAIN



PIC16F18446



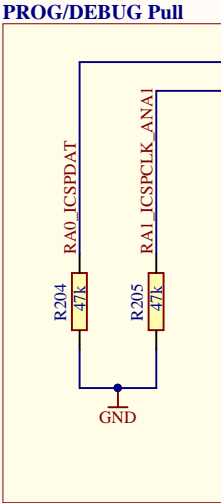
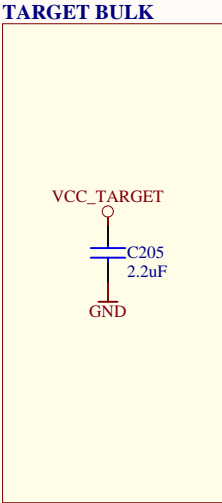
Crystal datasheet:
Crystal = 7pF
max ESR = 70kOhm
Accuracy ±20ppm

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

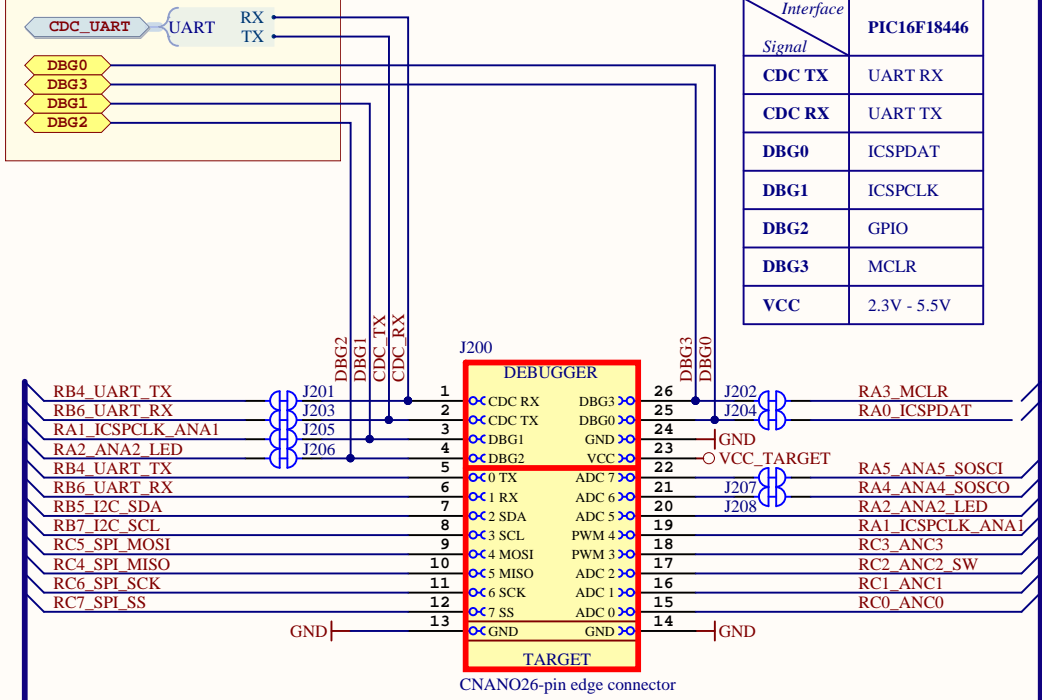
Estimated C_{pcb} = 2pF

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

Selected in design
C = 5pF



nEDBG CONNECTIONS



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).

Revision History

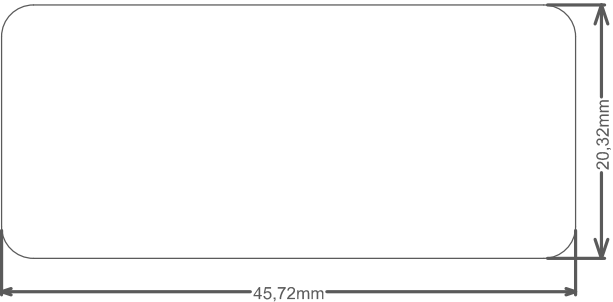
PCB Assembly Rev 1:

Design Changes:

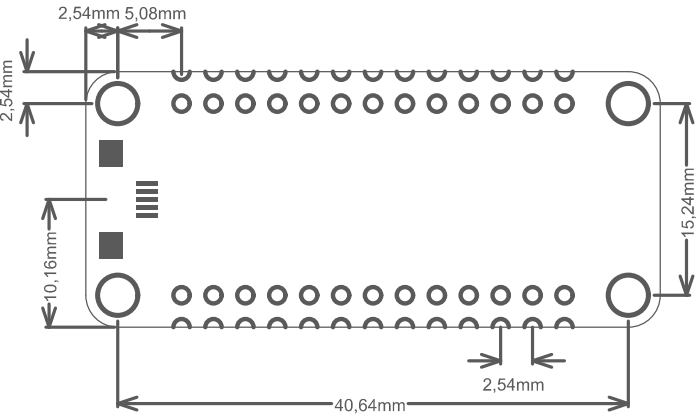
Initial Design

PCB:

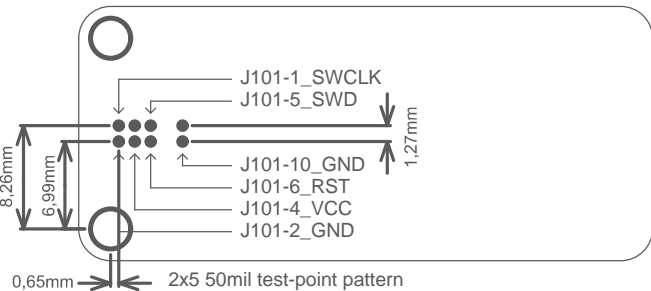
PCB revision 1

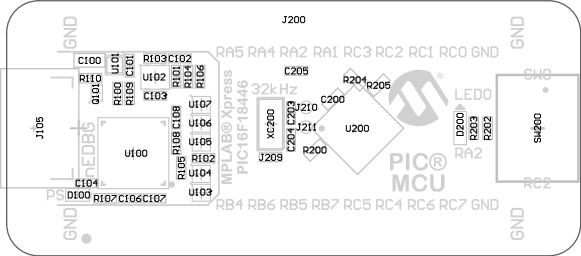


Connector Placement



Test Point Placement





GND

GND RC0 RC1 RC2 RC3 RA1 RA2 RA4 RA5

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POWER

UTG

GND

DBG0

DBG3

GND

UTG J101 J100 VREG

PCBA
LABEL1RA5 J207
RA4 J208

TARGET

RA3	J202	DBG3
RA2	J206	DBG2
RA1	J205	DBG1
RA0	J204	DBG0
RB4	J201	RX CDC
RB6	J203	TX

NEDBG DBG2

GND

J102

A08-2889 Rev1

GND RC7 RC6 RC4 RC5 RB7 RB5 RB6 RB4

DBG1

BOOTP100

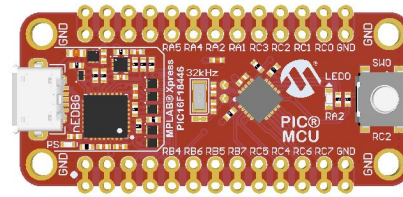
CDC TX

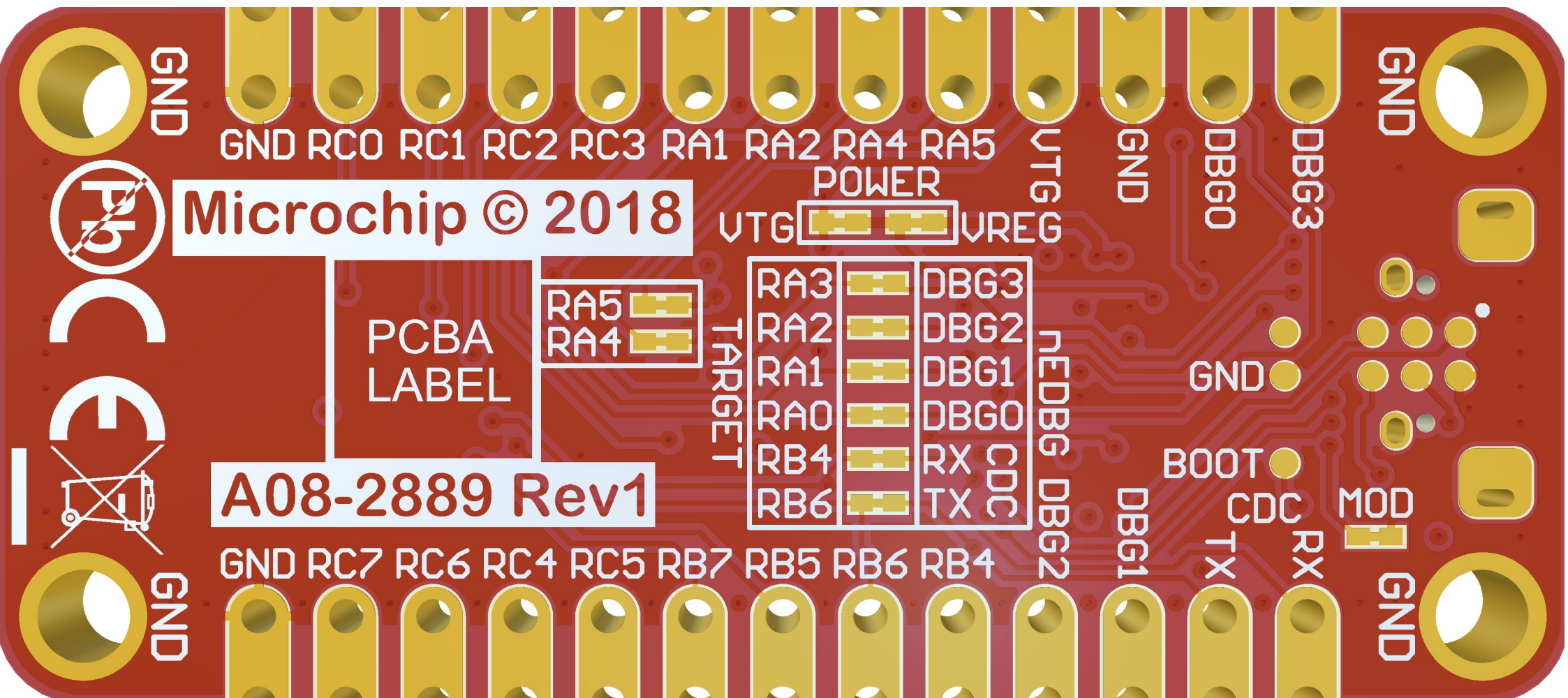
MOD J103

GND



GND





Microchip © 2018

PCBA
LABEL

A08-2889 Rev1

RA3		DBG3
RA2		DBG2
RA1		DBG1
RA0		DBG0
RB4		RX
RB6		TX

TARGET

RA5	
RA4	

POWER

UTG

VREG

MOD

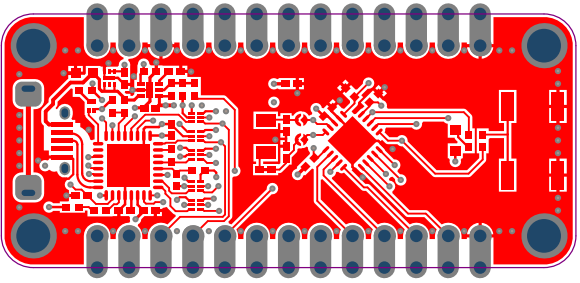
BOOT
CDC

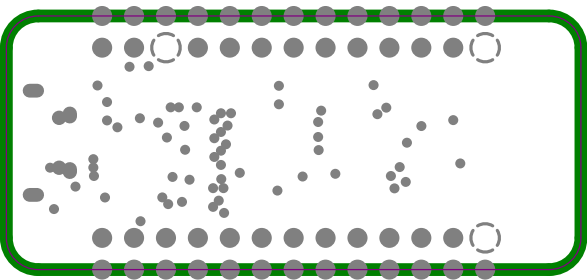
GND

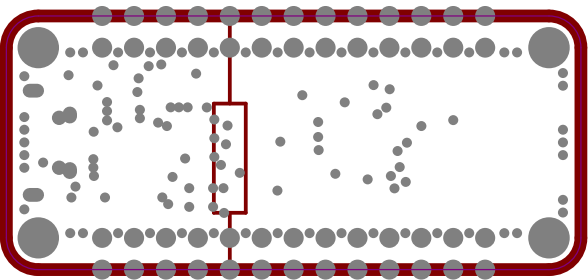
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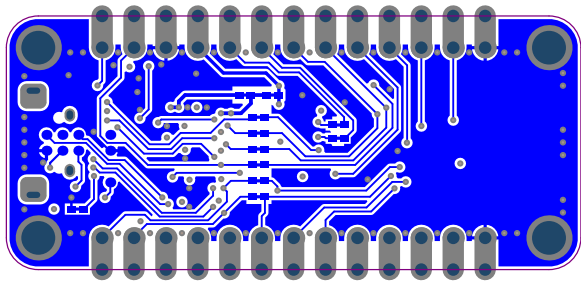
GND

GND









Component list

Bill of Materials Fitted For Variant [Default Assembly] of Project [PIC16F18446_MPLAB_Xpress.PrjPcb] (No PCB Document Selected)

Source Data From:

PIC16F18446_MPLAB_Xpress.PrjPcb

Project:

PIC16F18446_MPLAB_Xpress.PrjPcb

Variant:

Default Assembly

Report Date: 16.01.2018 14:31:23
Print Date: 16.01.2018 14:31:08



Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100	1	10uF/16V	Taiyo Yuden	EMK107BBJ106MA-T	Ceramic capacitor, SMD 0603, X5R, 16V, 10UF ± 20% (High Density)
Fitted	C101	1	2.2uF	Kemet	C0402C225M9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-20%
Fitted	C102, C104, C107, C108, C200	5	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C103, C205	2	2.2uF	tdk	C1005X5R1A225K	CAP CER 2.2UF 10V 10% X5R 0402
Fitted	C106	1	1u	Kemet	C0402C105K9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-10% (de26942)
Fitted	C203, C204	2	5.0p	Murata	GRM1555C1H5R0CA01D	Ceramic capacitor, SMD 0402, NPO, 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 Small 6x6mm	ACT Logimark AS	505462	PCBA identification label PP Top White Gloss
Fitted	PCB1	1	MPLAB Xpress PIC16F18446 PCB documentation			MPLAB Xpress PIC16F18446 PCB documentation
Fitted	PCBDOC1	1	A09-3120 PCBA files			MPLAB Xpress PIC16F18446 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, R204, R205	8	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, R202, R203	5	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	MPLAB Xpress PIC16F18446 test			Fixture test for MPLAB Xpress PIC16F18446
Fitted	TESTDOC1	1	PIC16F18446 MPLAB Xpress Test Instructions			PIC16F18446 MPLAB Xpress 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, 1.6x1.6mmMLF
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	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

49

Approved

Notes