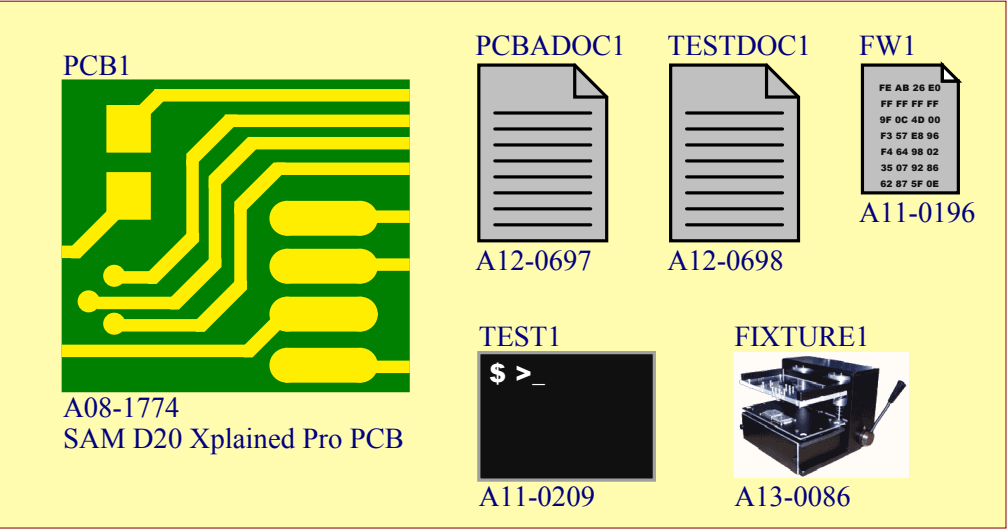



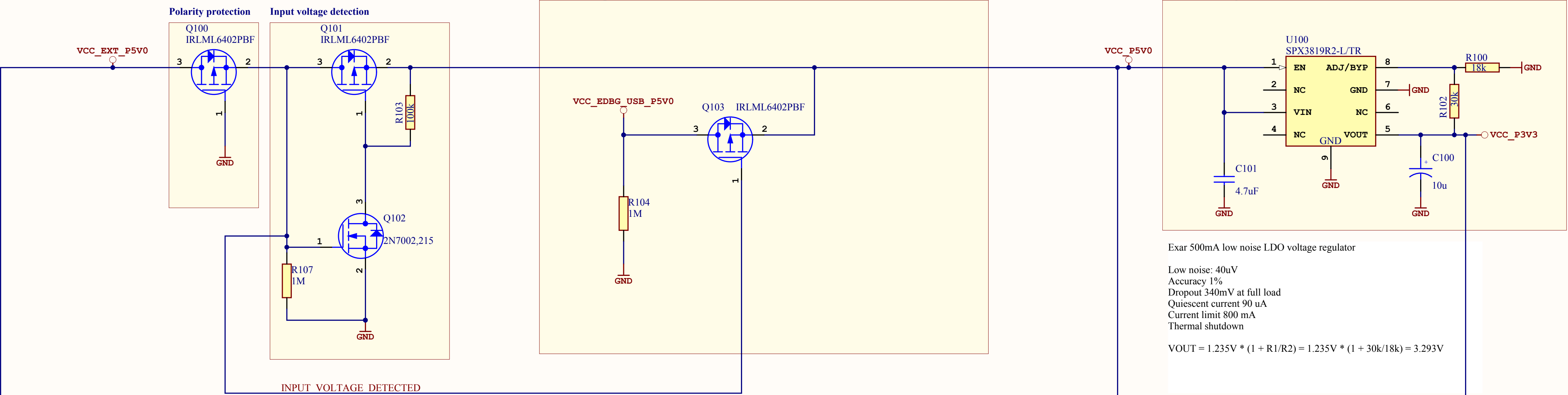
Label PCBA



ATMEL Norway	*		 Enabling Unlimited Possibilities		
Vestre Rosten 79	*				
N-7075 TILLER	*				
NORWAY					
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Document number:	A09-1873		Revision	4	
TITLE: Top Level Schematics					
SAMD20_Xplained_Pro_TopLevel.SchDoc					

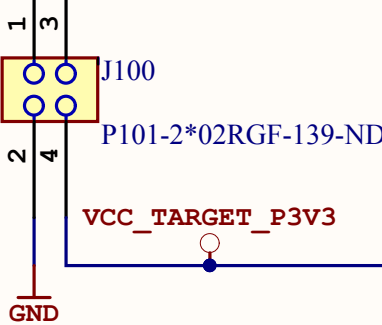
Power multiplexer

3.3V linear regulator



Each FET in the power path has a R_{DSon} of <50mOhm@VGS= -5V with a current of up to 20A. That means we can expect a maximum voltage drop across the FETs of 50mV@500mA, 100mV@1A and 200mV@2A.

Power Connector



Power inputs to the Xplained PRO:

VCC_EXT_P5V0
This power input can be used to power the whole board and it has a higher priority as the USB power input.

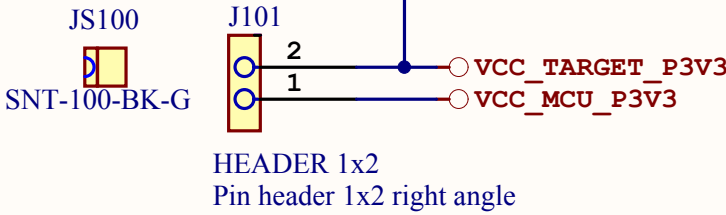
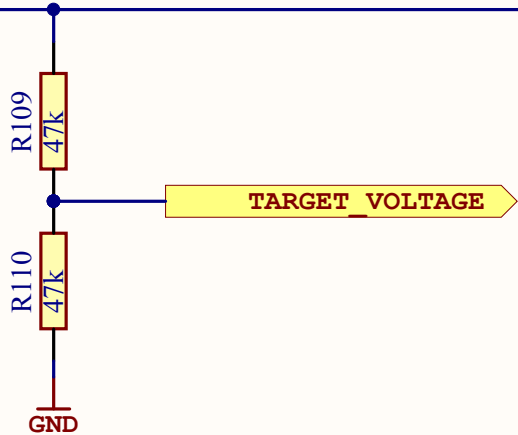
VCC_EDBG_USB_P5V0
EDBG USB power input. This supply is used when VCC_EXT_P5V0 is not present.

Other voltages:


VCC_P5V0
This supply is connected to either VCC_EXT_P5V0 or VCC_EDBG_USB_P5V0, based on the availability and priority of these supplies.

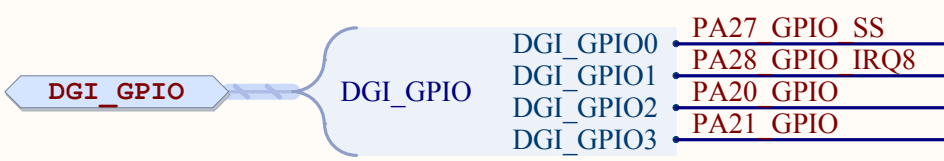
VCC_P3V3
Regulated 3.3V from VCC_P5V0

VCC_TARGET
Target supply voltage (target MCU and peripherals)



For current measurements of the target MCU remove this jumper and connect a measurement instrument.

ATMEL Norway	*				
Vestre Rosten 79	*				
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NORWAY					
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Document number:	A09-1873		Revision	4	
TITLE: Power supply					
SAMD20_Xplained_Pro_dual_input_power_supply.SchDoc					



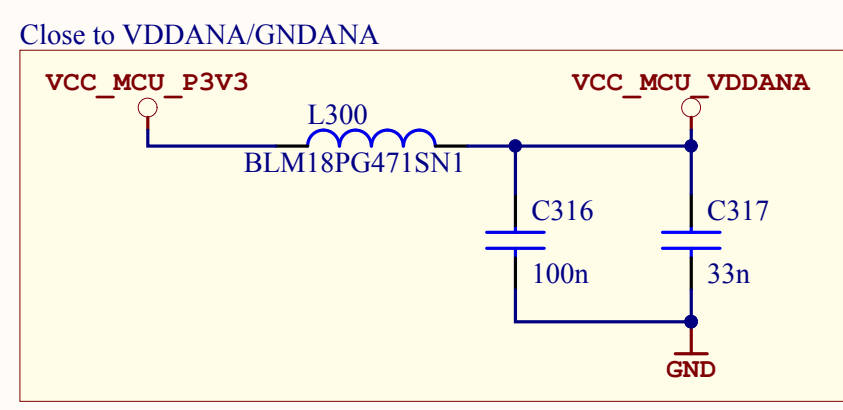
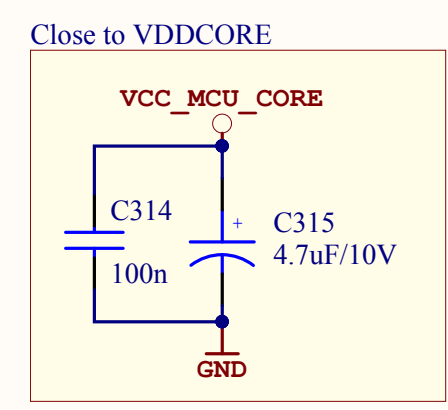
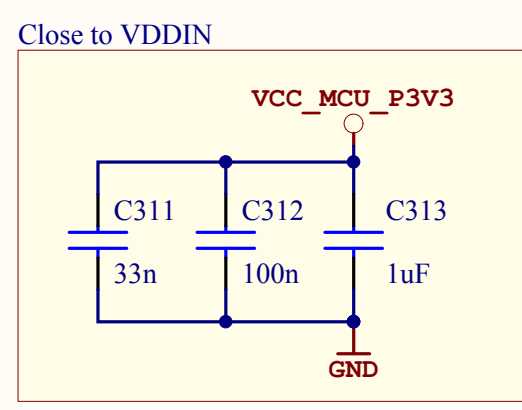
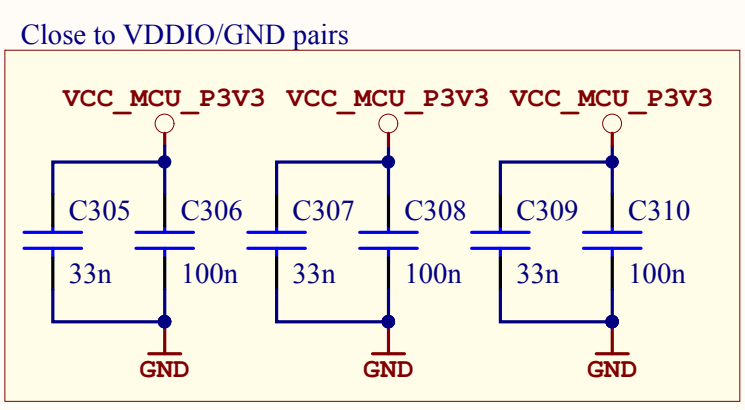
32 kHz Crystal

Calculation of crystal load capacitors:
 $C_{ext} = 2 \times (C_{crystal} - C_{para} - C_{pcb})$

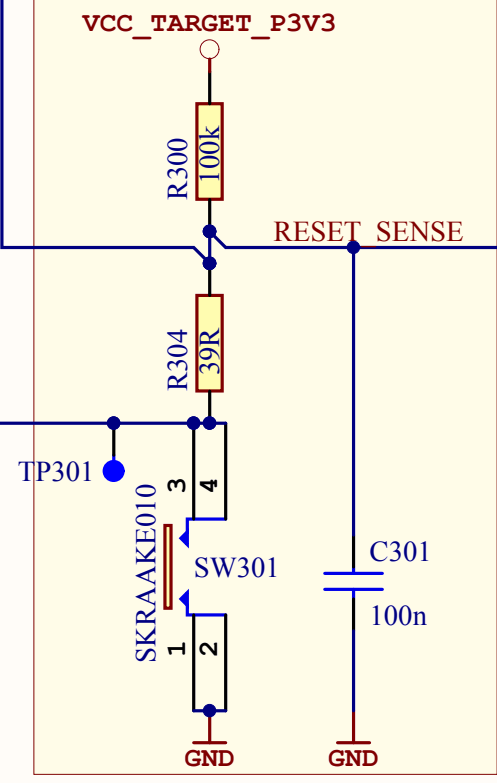
Crystal = 7.0pF (from crystal datasheet)
Cpara = 3.15pF (from MCU datasheet)
Cpcb = 0.5pF (estimate)


$C_{ext} = 2 \times (7.0pF - 3.15pF - 0.5pF) = 6.7pF$

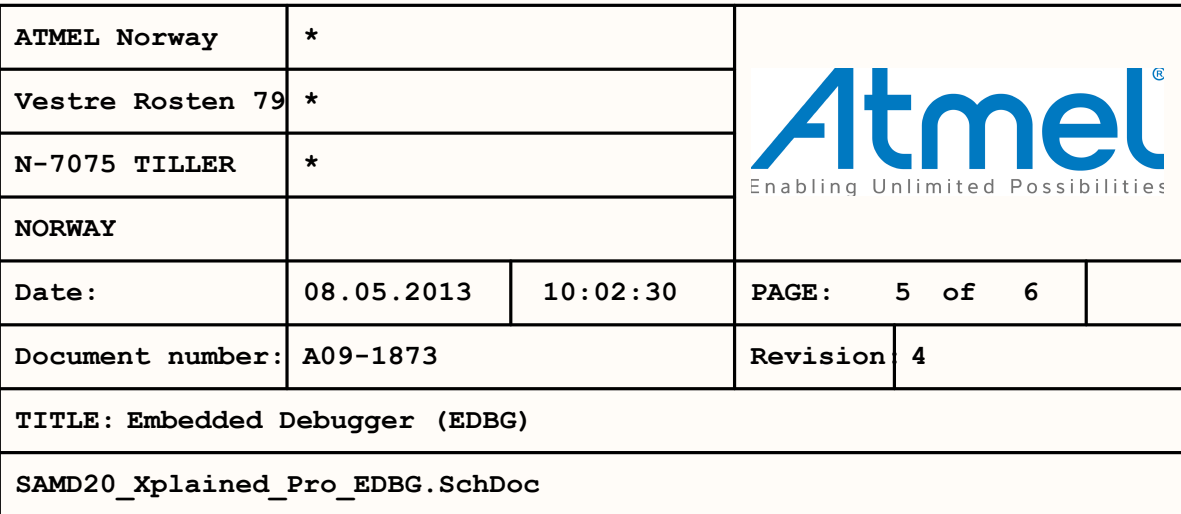
These straps with SMD pads can be used to place a resistor in the XOUT signal in order to measure the oscillator allowance. By default these straps are closed and nothing is mounted on the pads.

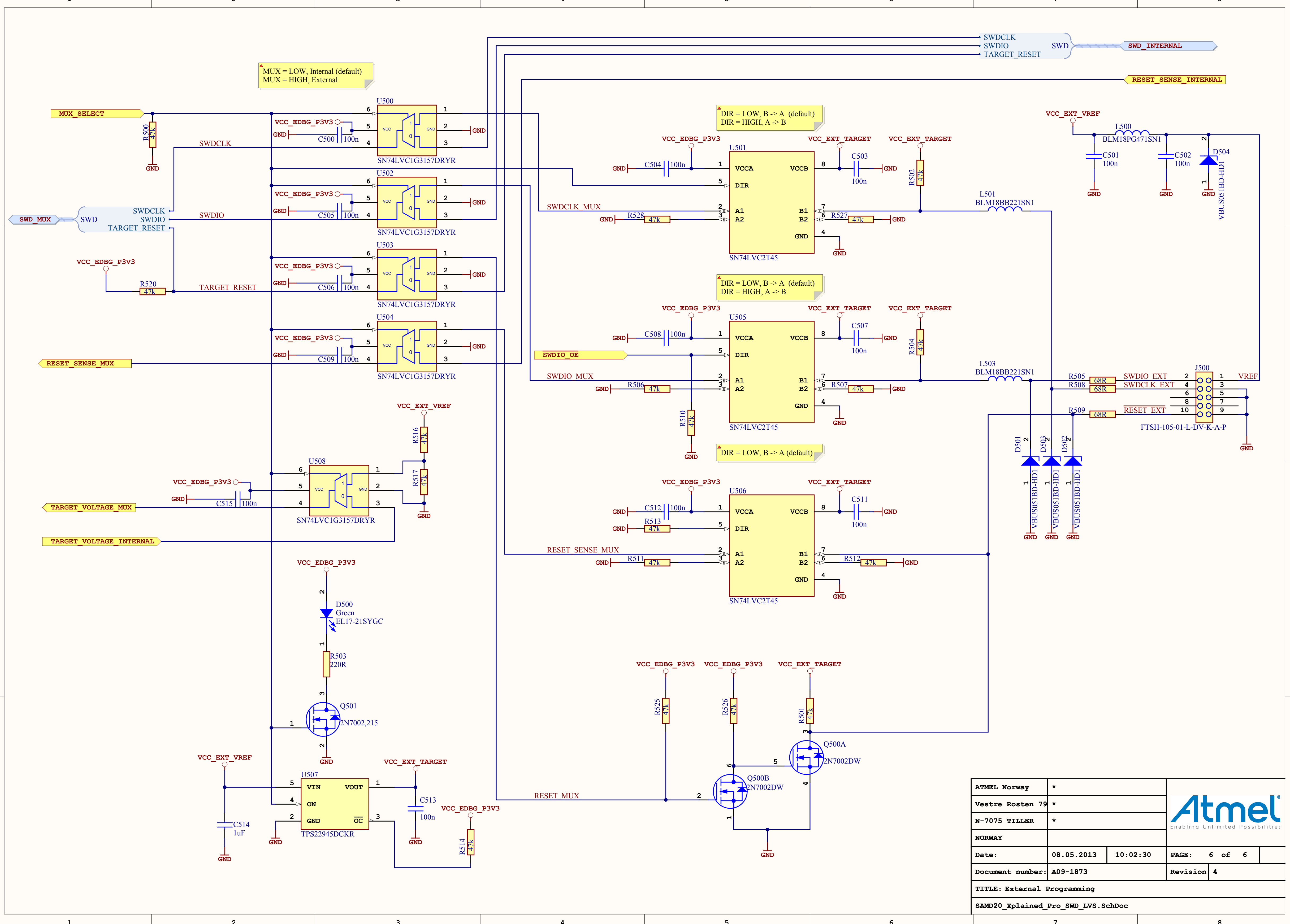


RESET button with current limit and noise filter

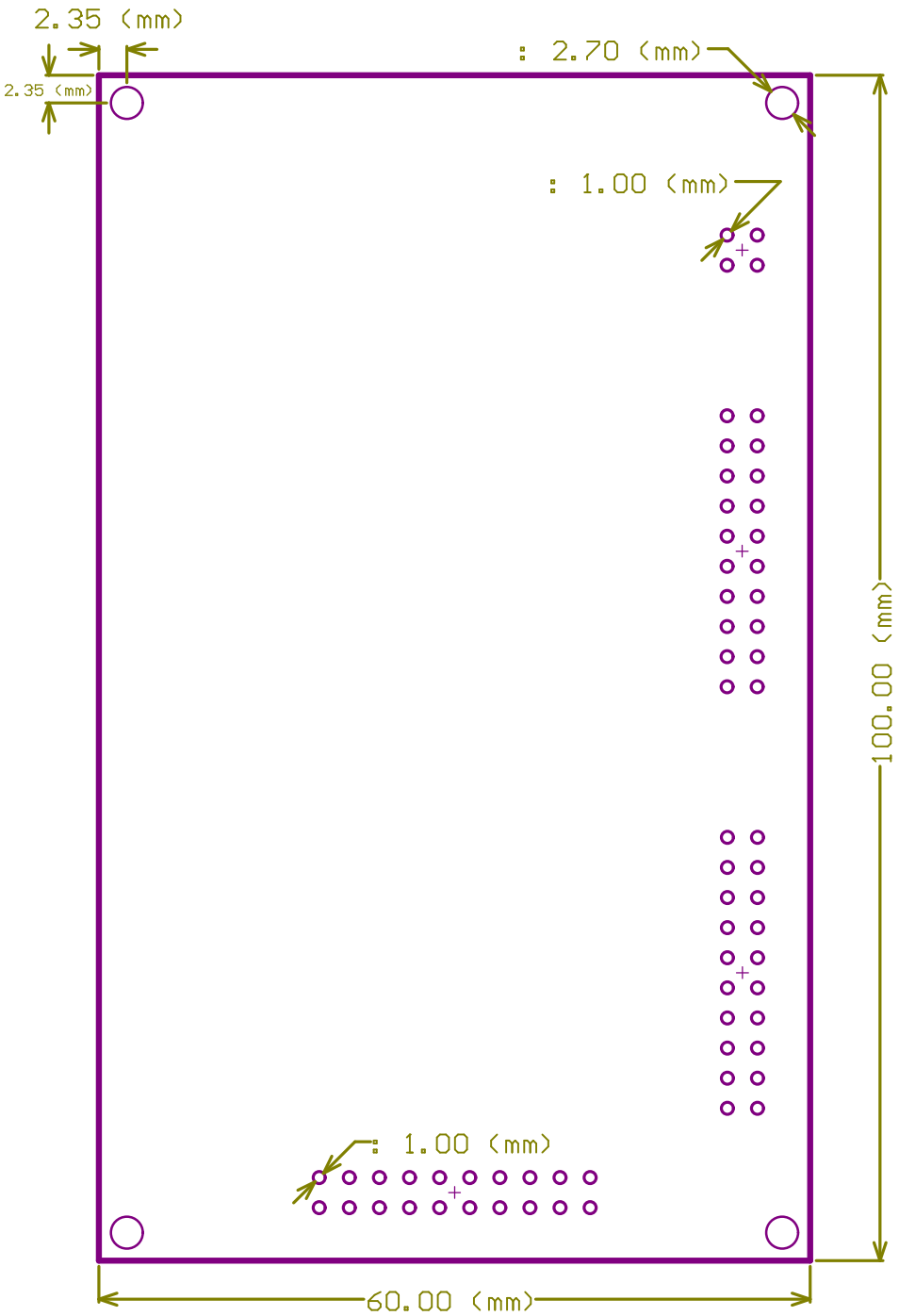


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N-7075 TILLER		*			
NORWAY					
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Document number:		A09-1873		Revision	4
TITLE: Target MCU					
SAM20 Xplained Pro Target MCU.SchDoc					

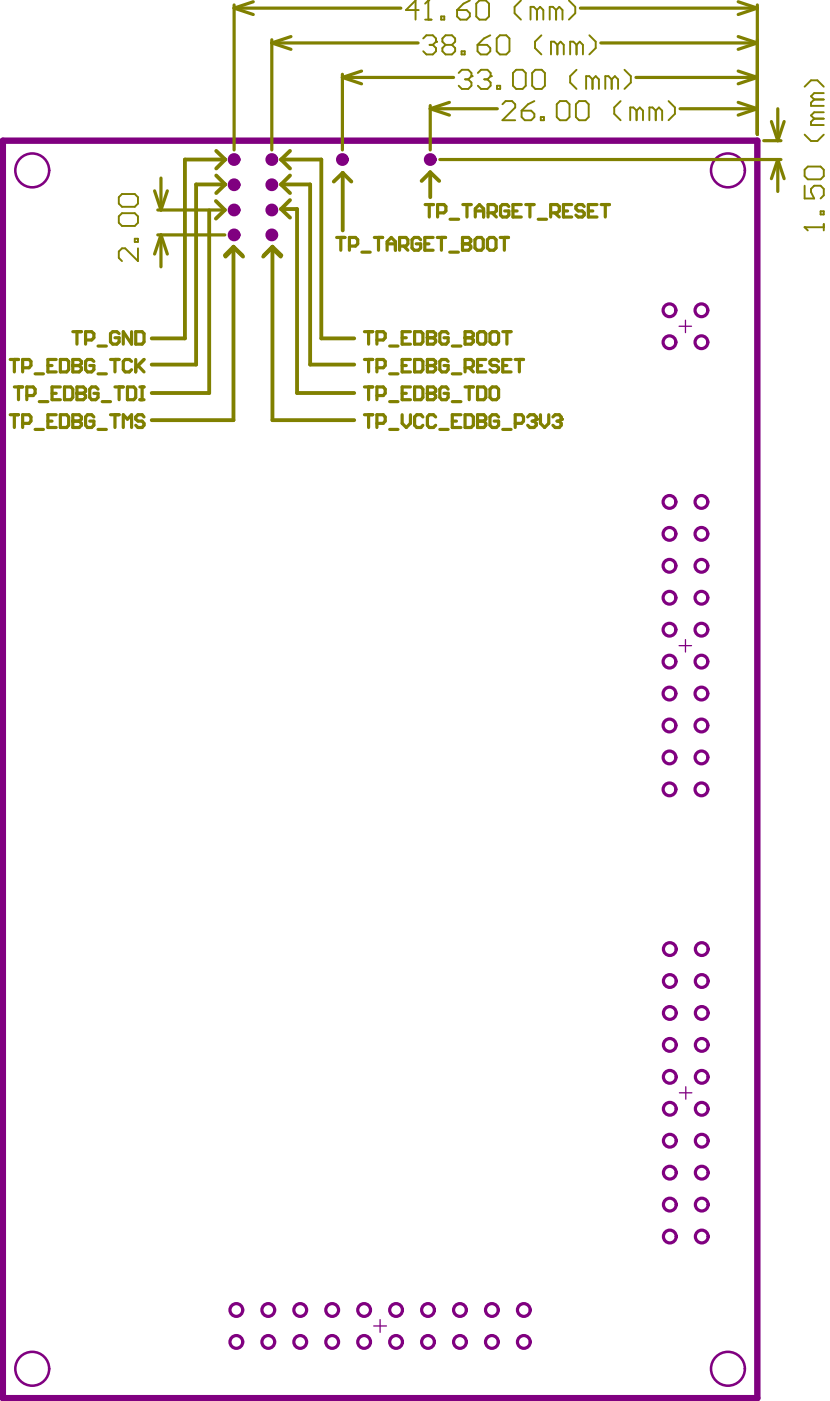




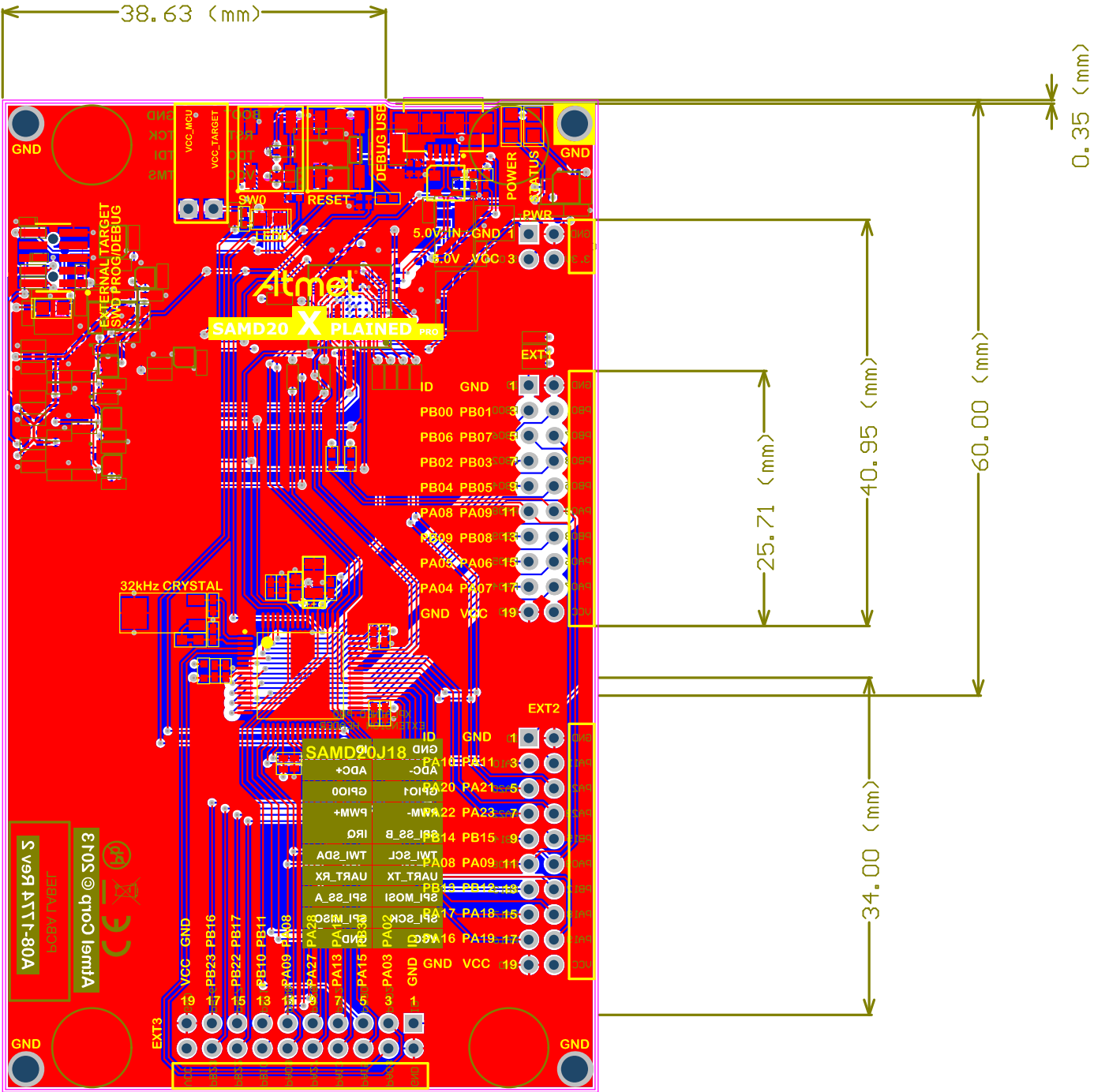
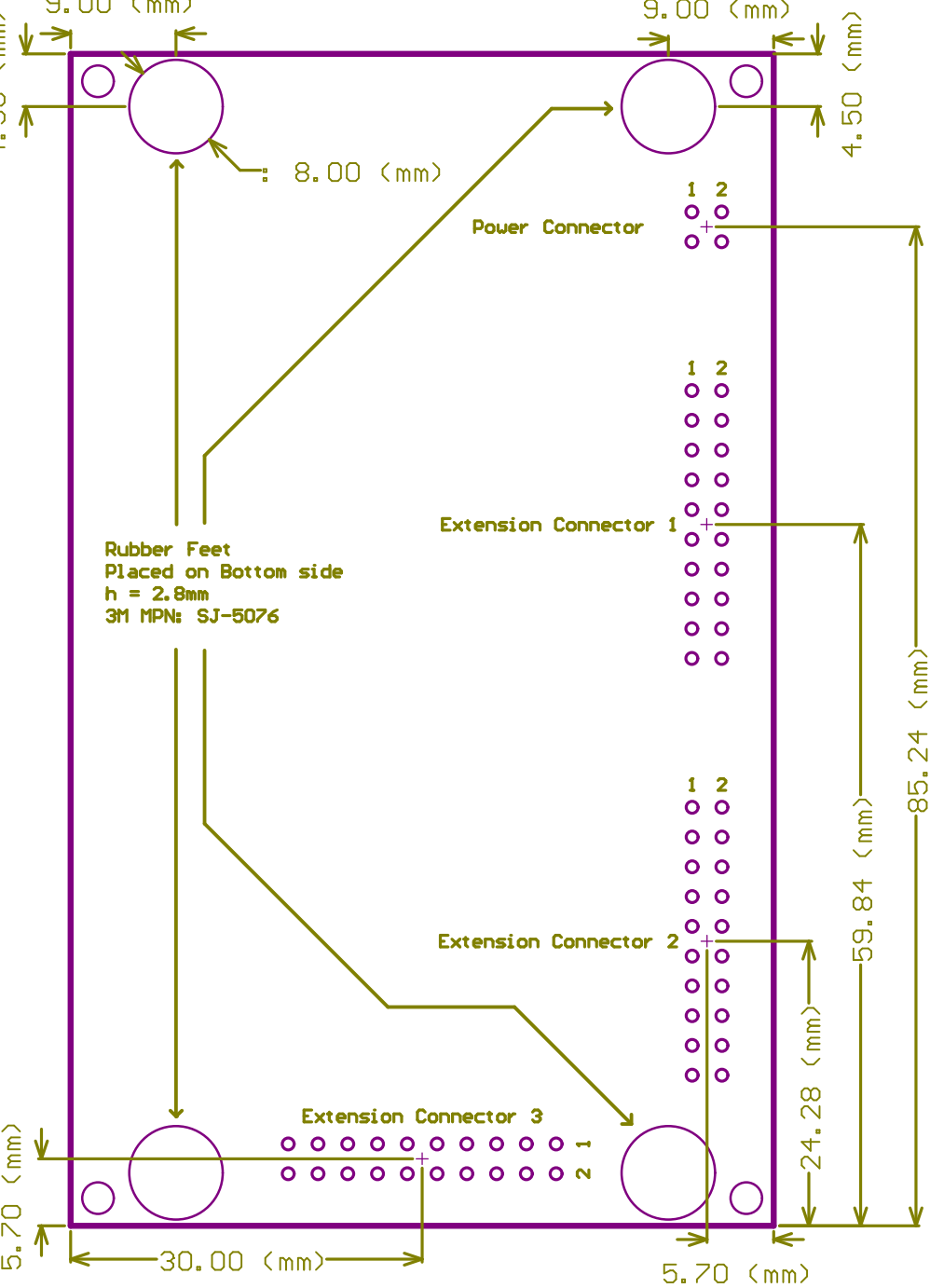
Medium MCU Mechanical Dimensions




Medium MCU Test Points



Medium MCU Component Placement



 ATMEL NORWAY Vestre Rosten 79 N-7075 Tiller	ENGINEER:	TITLE:	
	PCB DESIGNER:		
	DATE:	PART NO.:	REV:
	FILE NAME:	DWG NO.:	SCALE:

GND



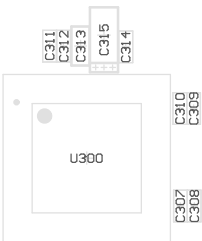
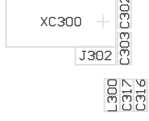
EXTERNAL TARGET
SWD PROG/DEBUG



Atmel

SAMD20 X PLAINED PRO

32kHz CRYSTAL



SAMD20J18

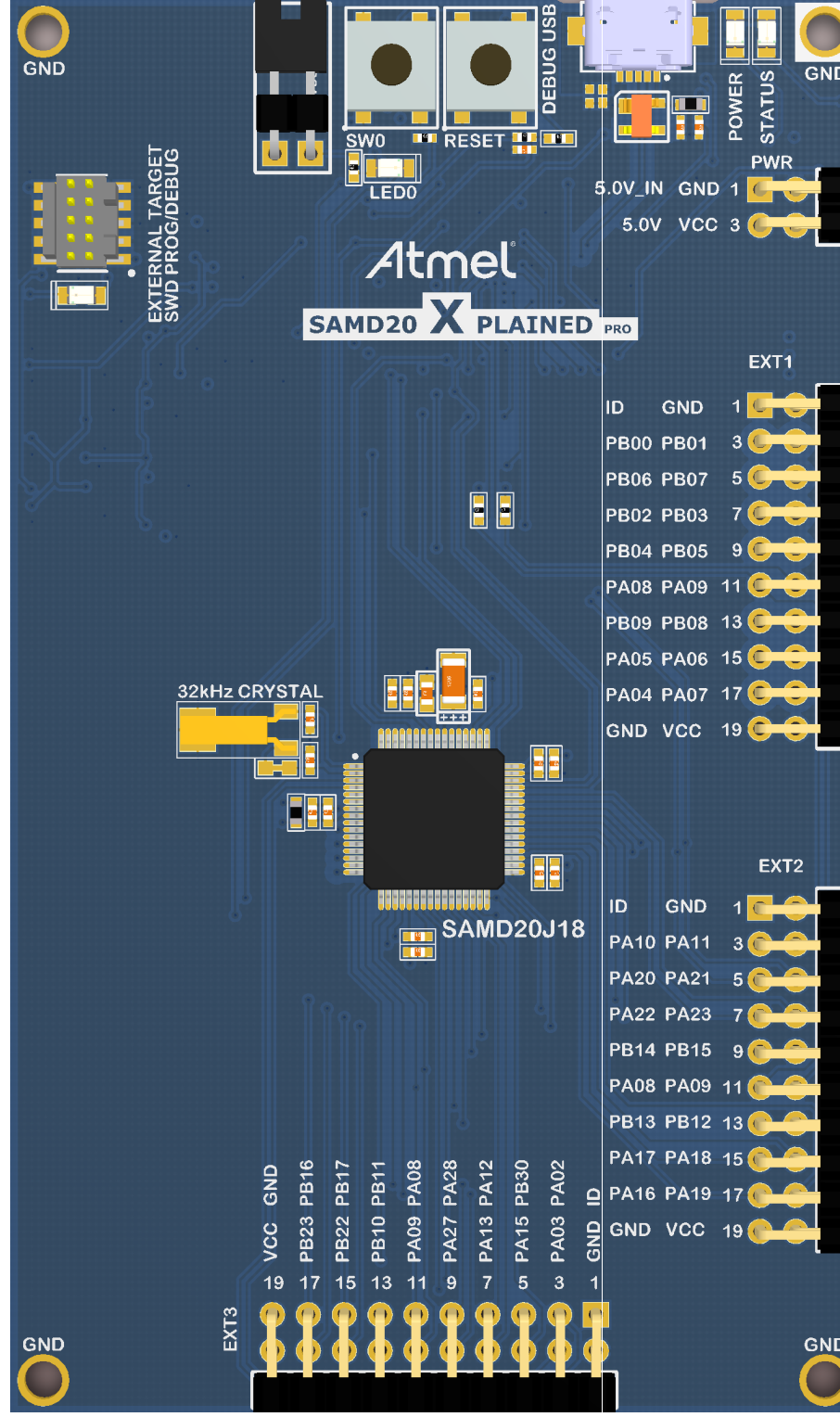


EXT3



GND

GND



Atmel[®]
SAMD20 X PLAINED PRO

EXTERNAL TARGET
SWD PROG/DEBUG

32kHz CRYSTAL

SAMD20J18

5.0V_IN GND 1
5.0V VCC 3

POWER
STATUS

PWR

EXT1

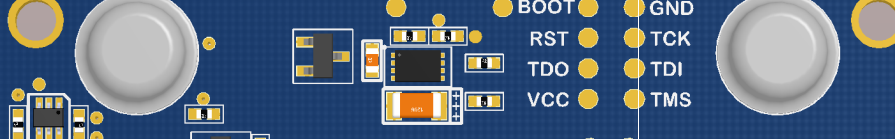
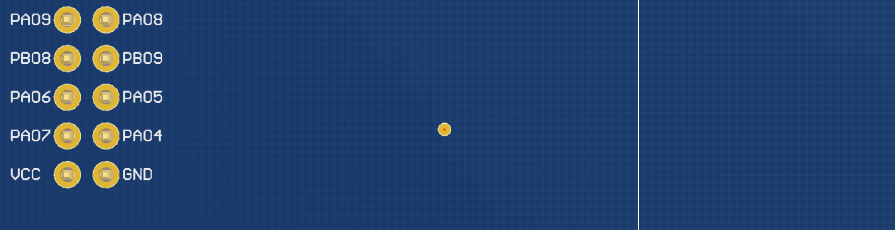
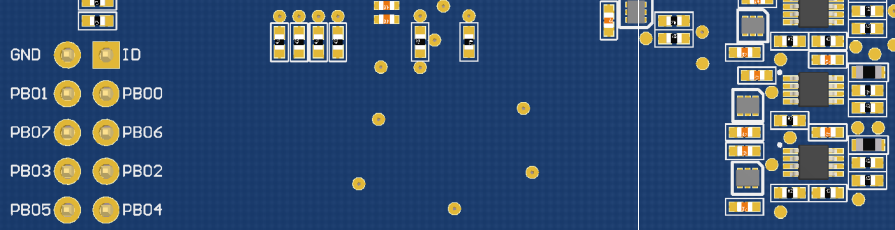
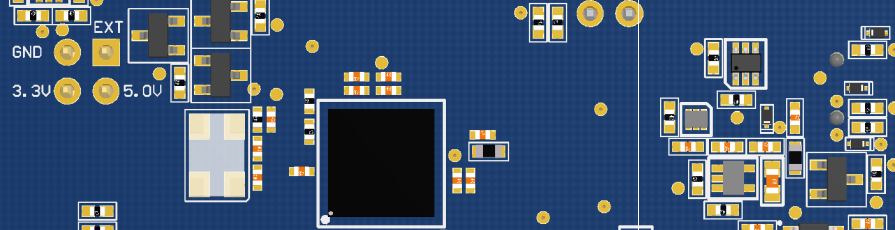
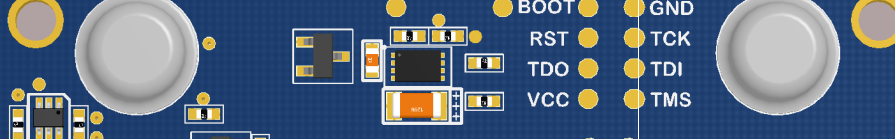
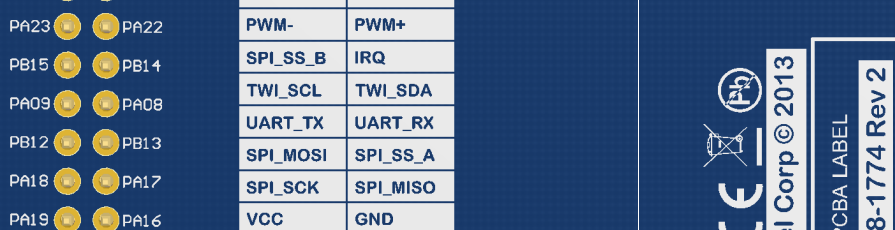
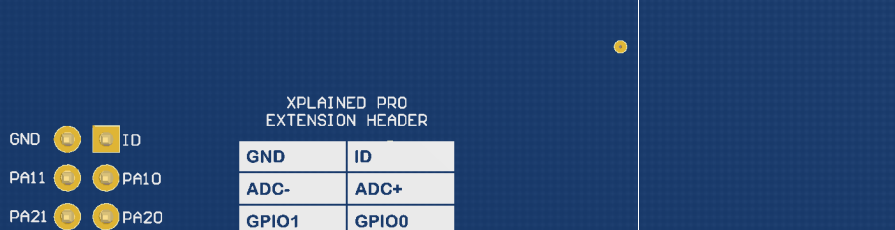
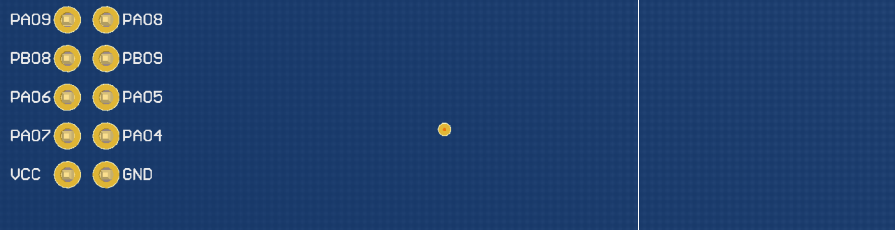
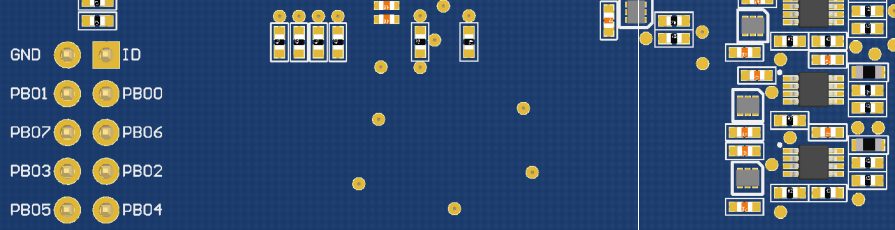
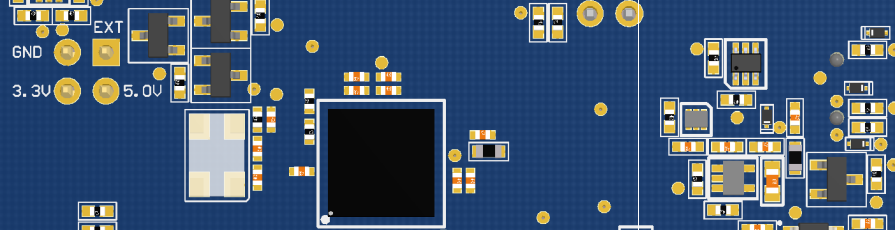
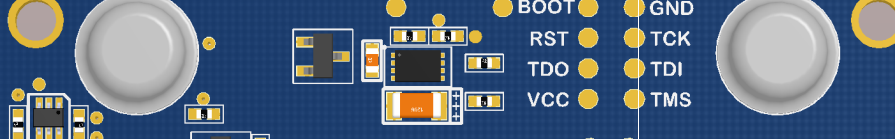
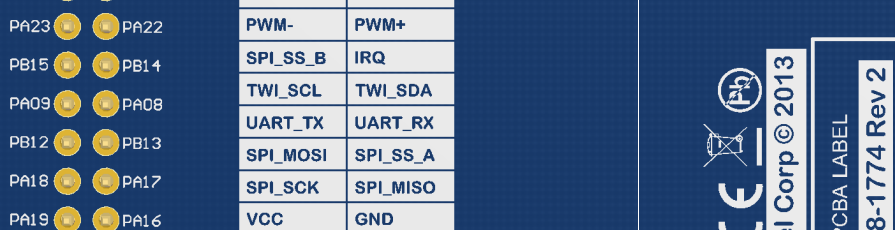
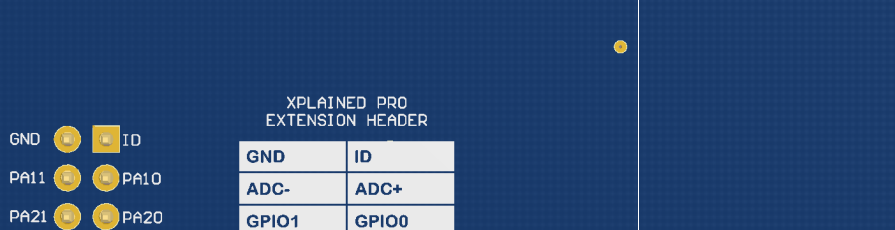
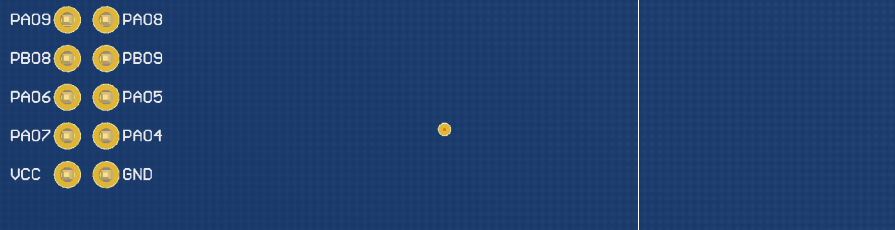
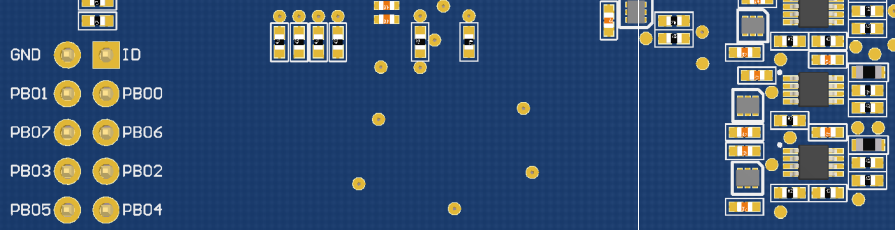
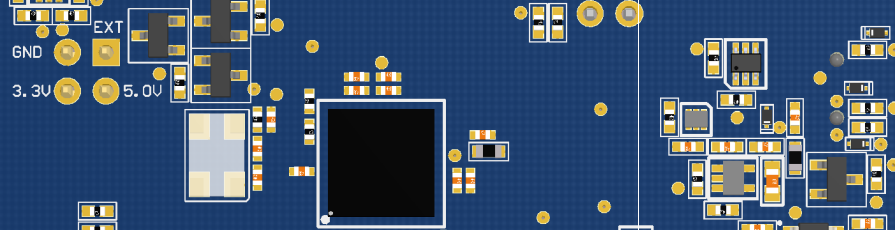
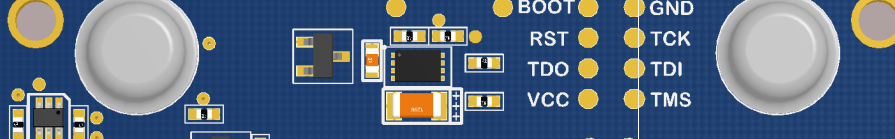
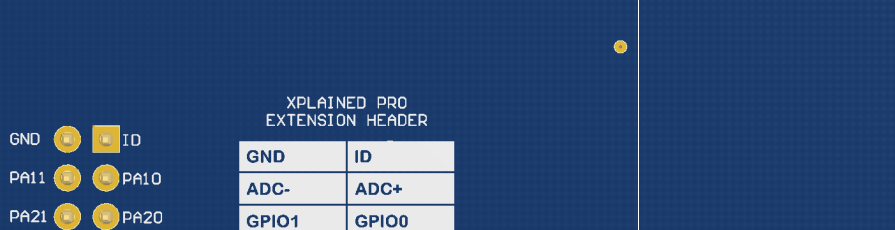
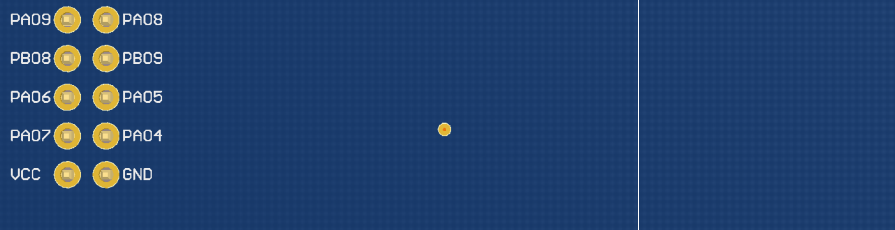
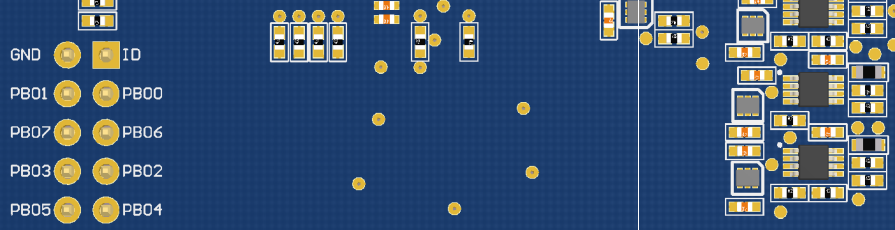
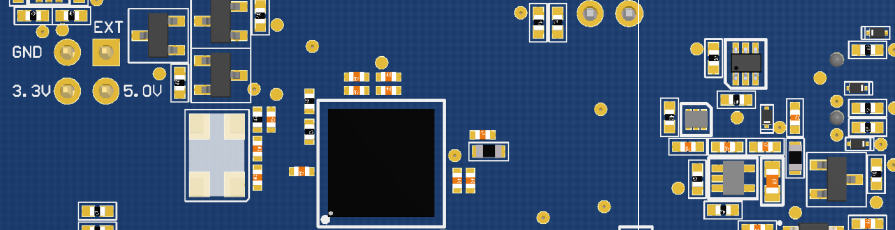
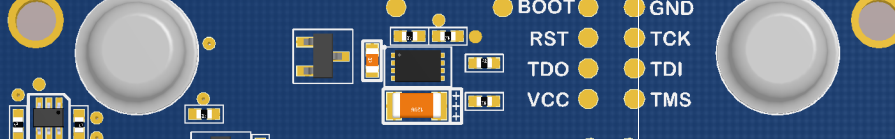
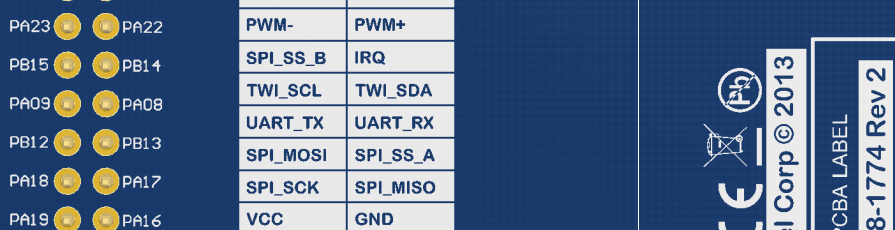
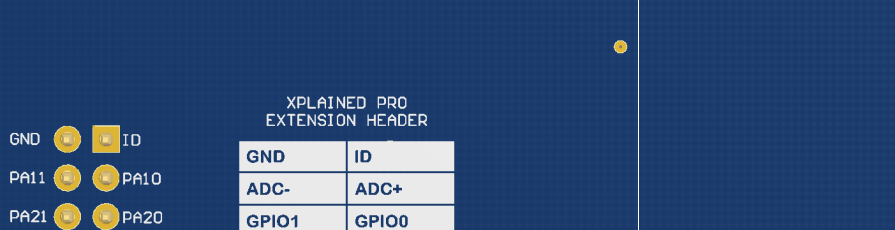
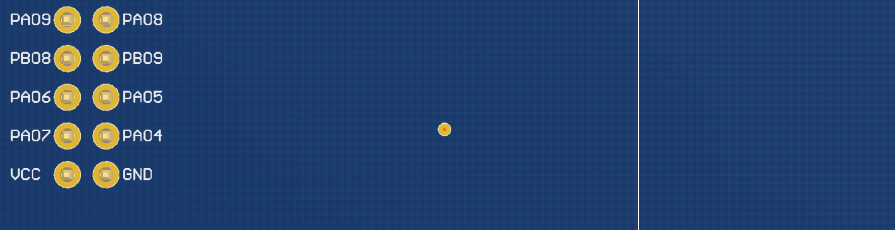
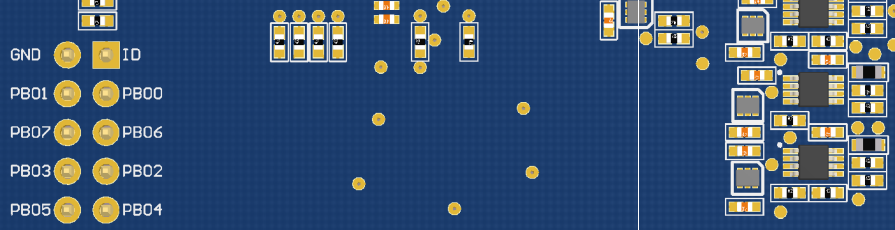
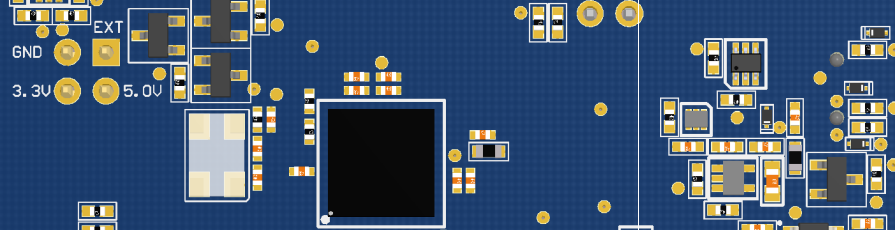
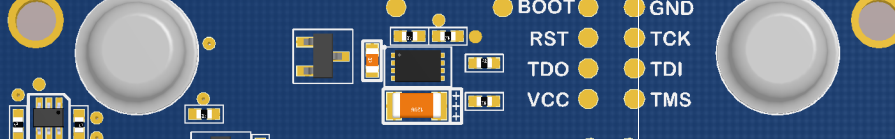
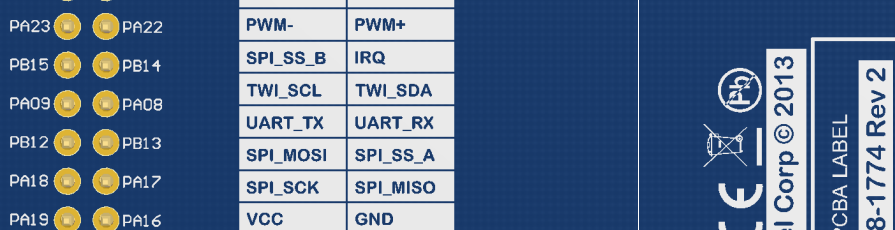
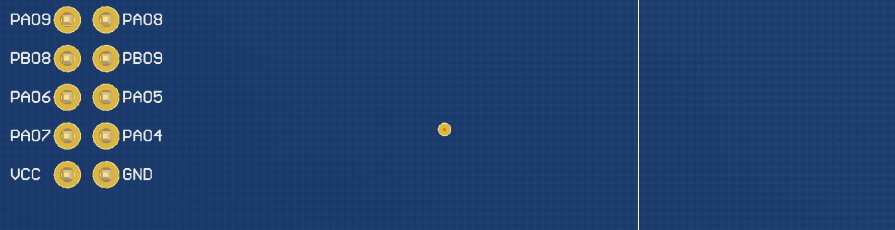
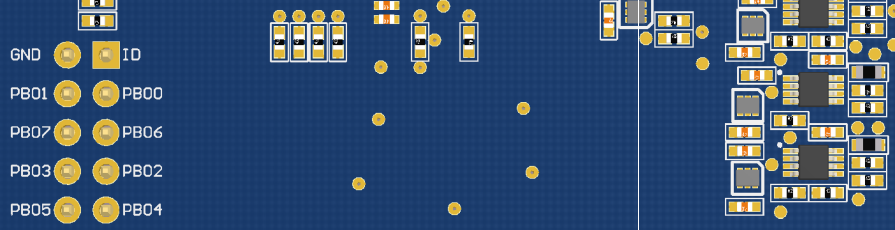
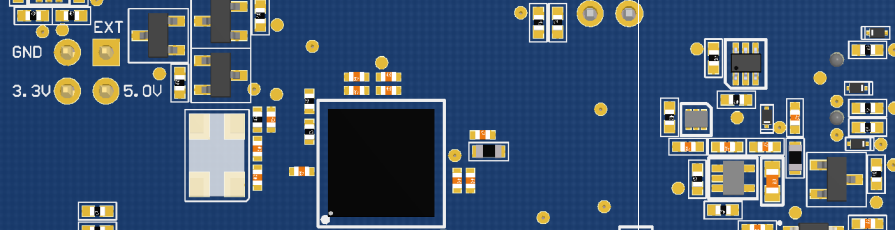
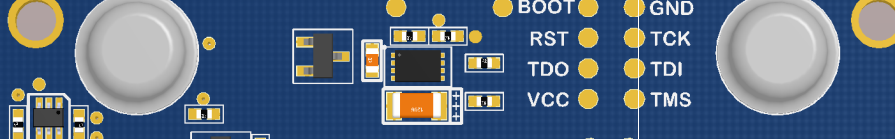
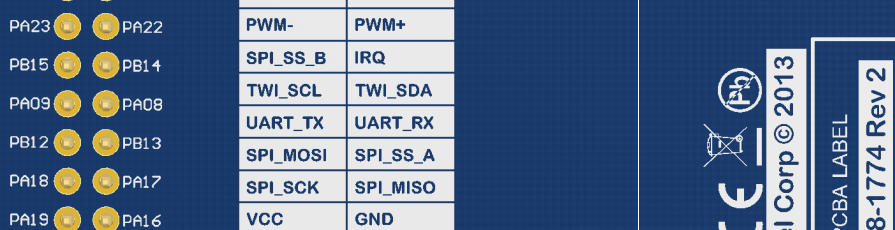
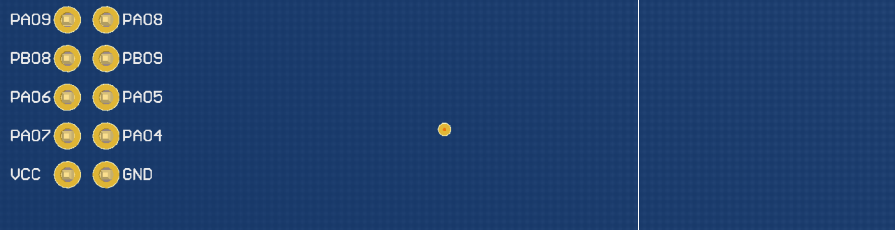
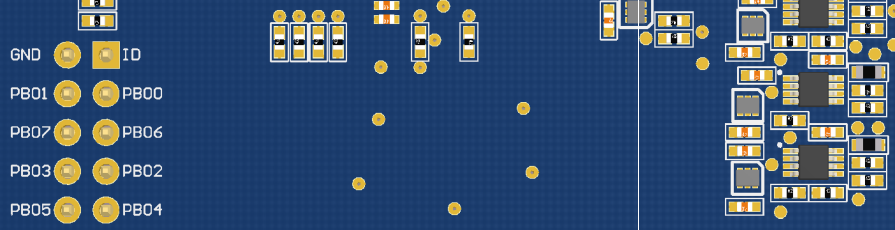
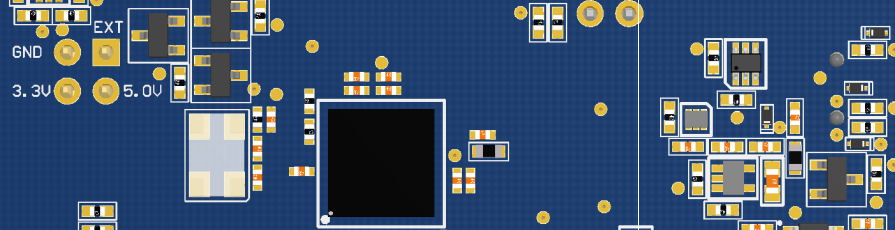
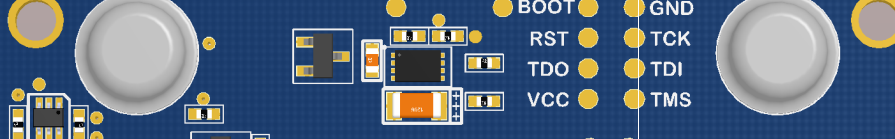
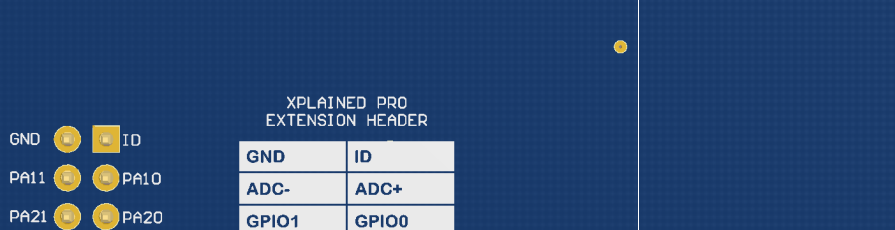
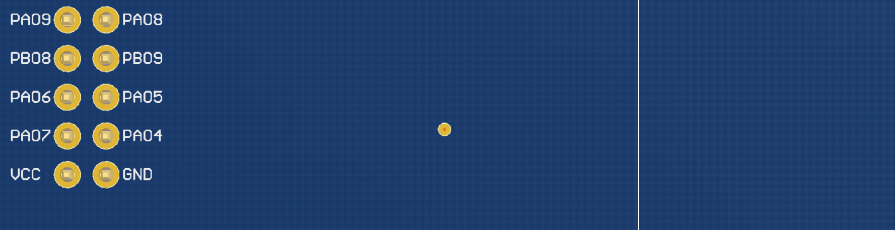
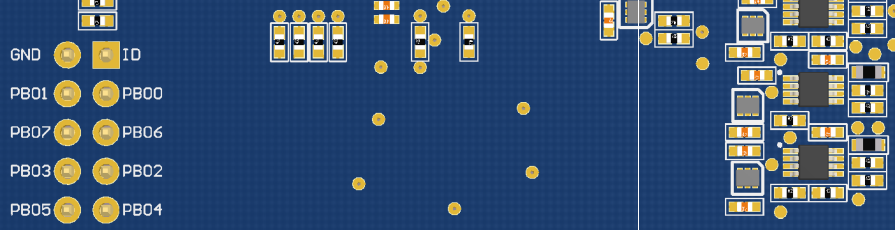
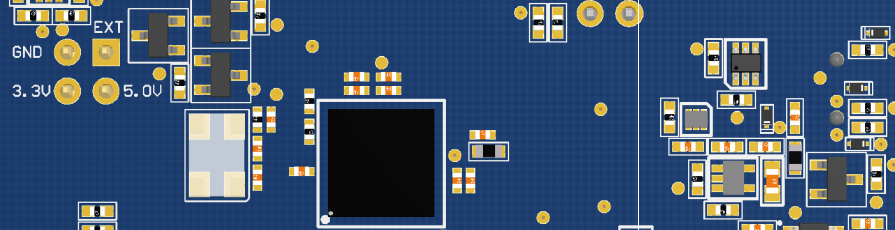
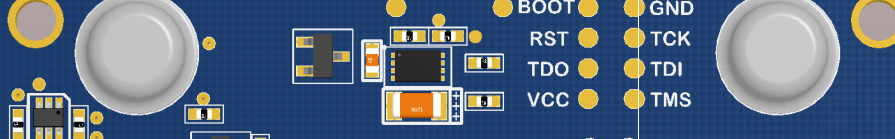
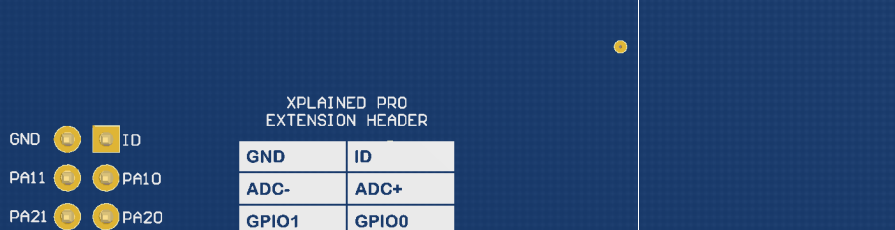
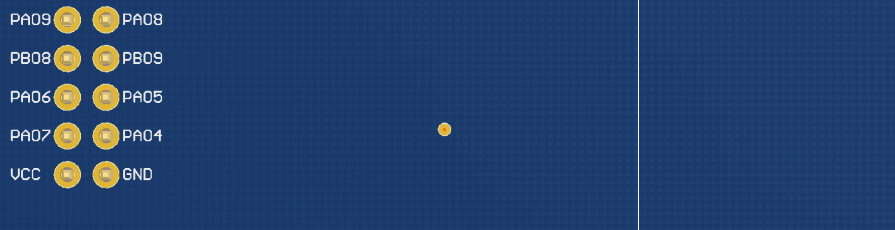
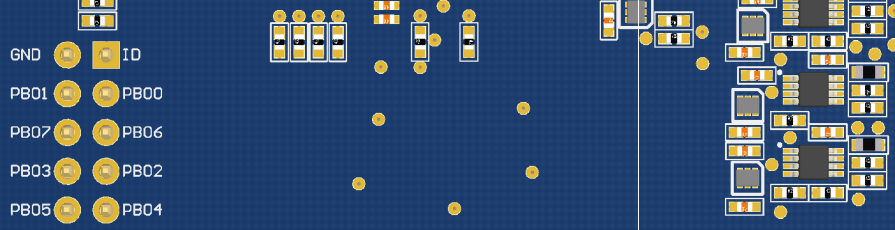
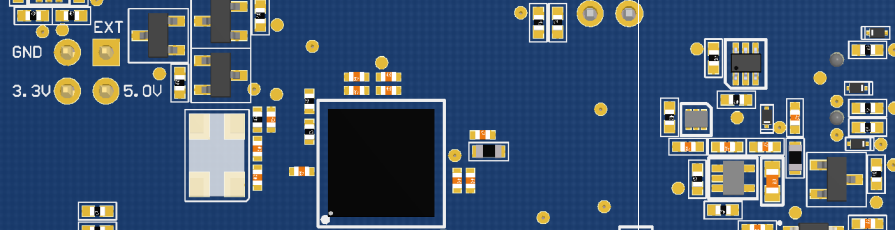
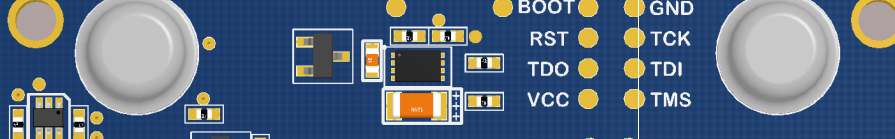
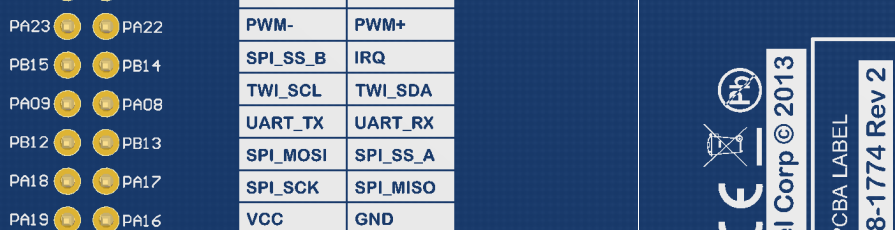
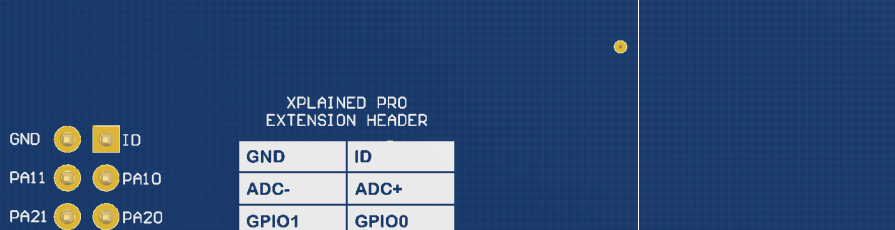
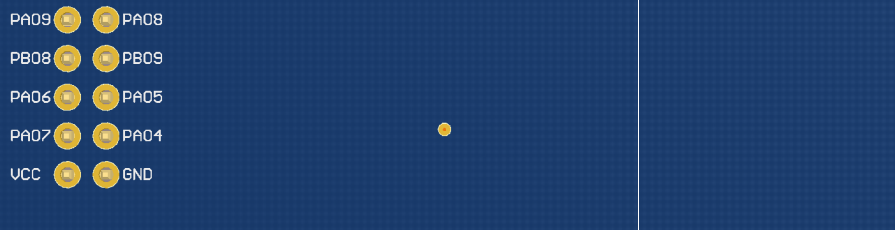
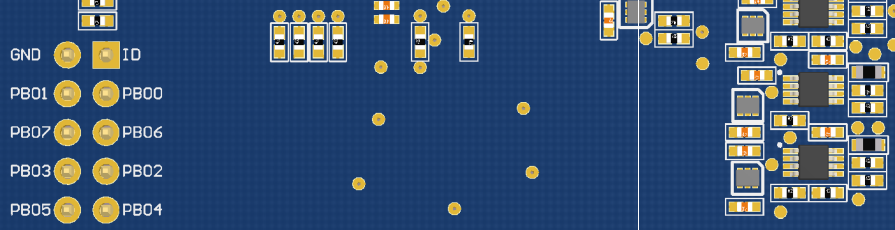
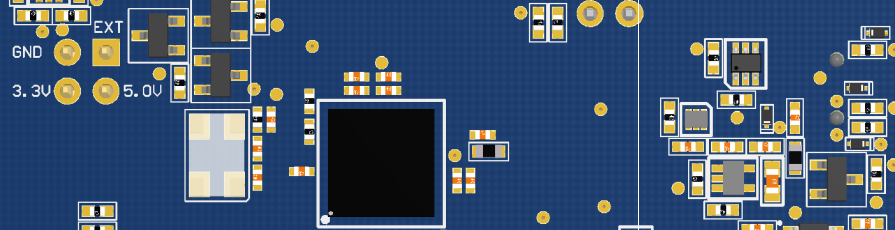
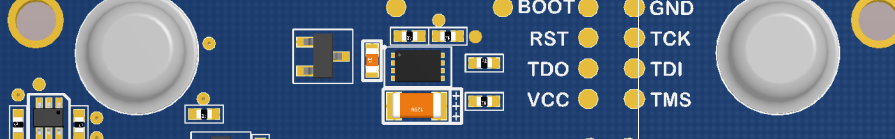
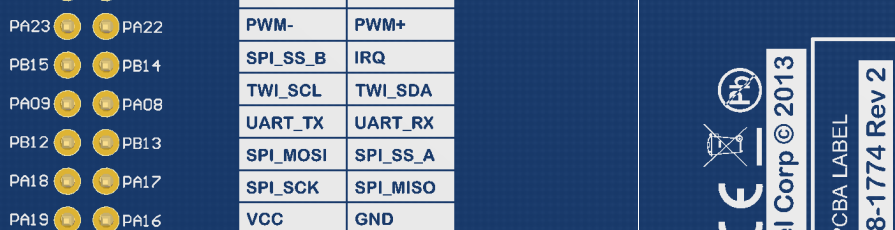
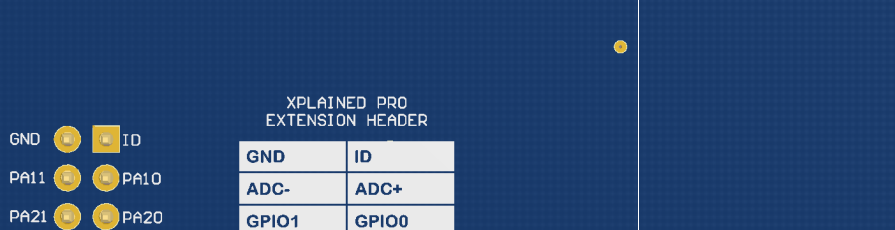
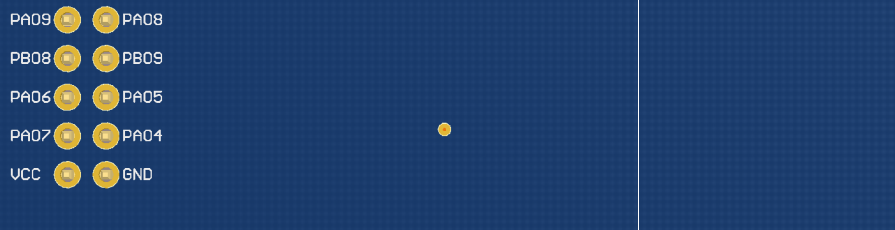
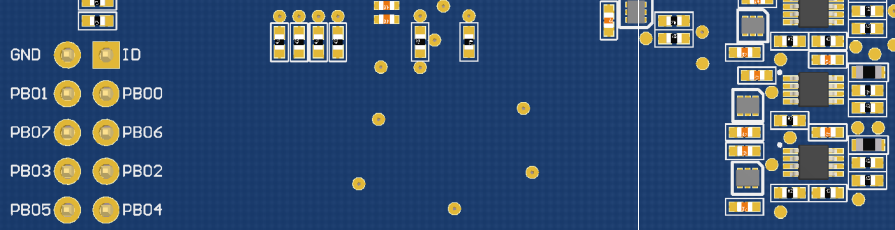
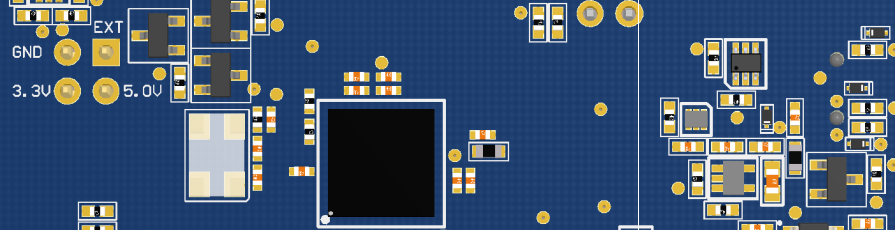
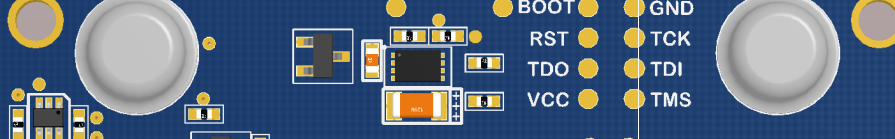
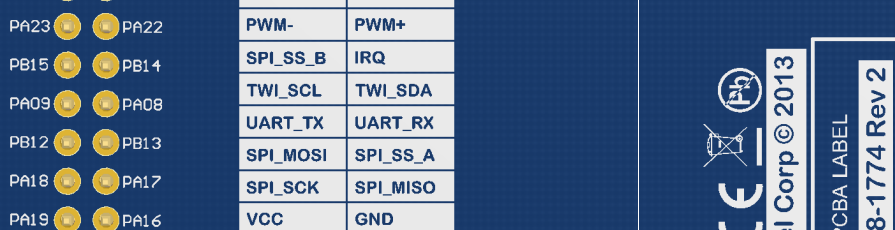
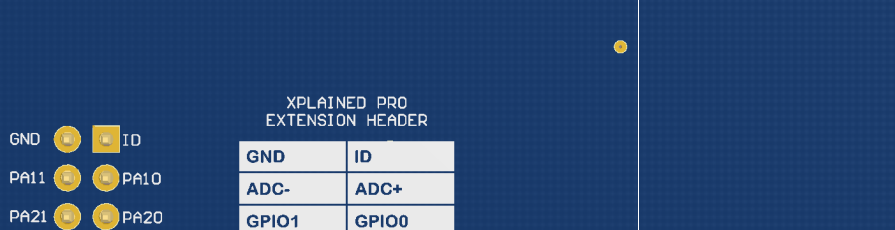
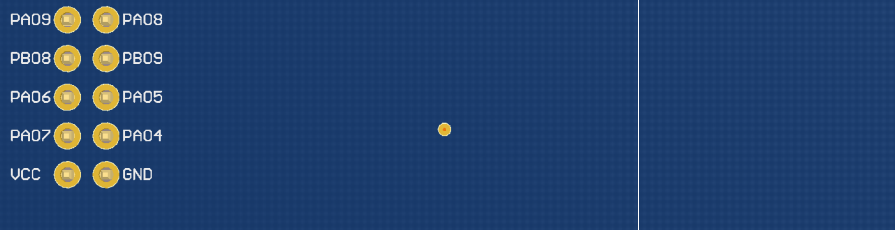
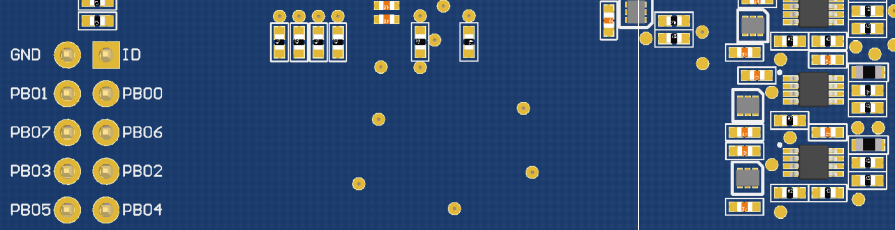
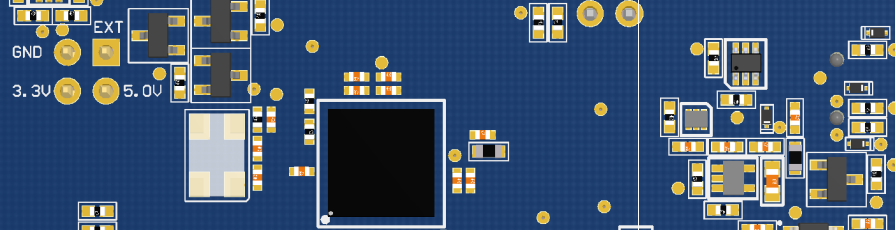
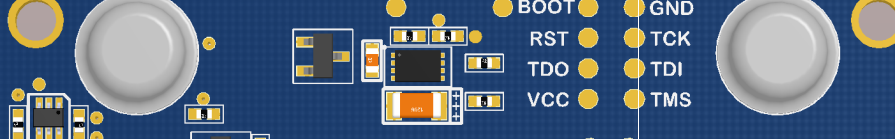
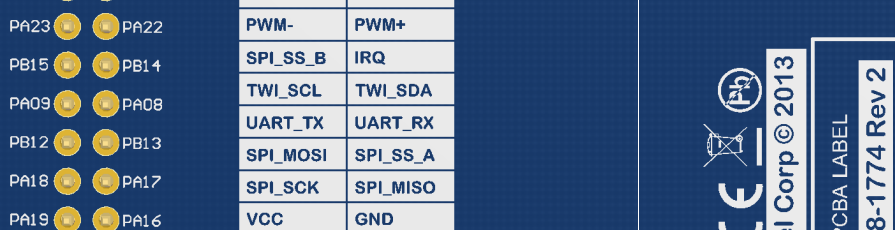
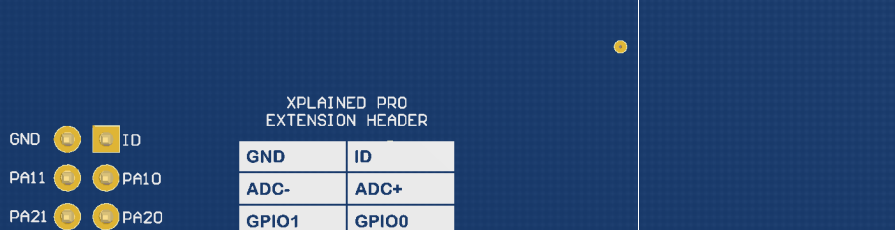
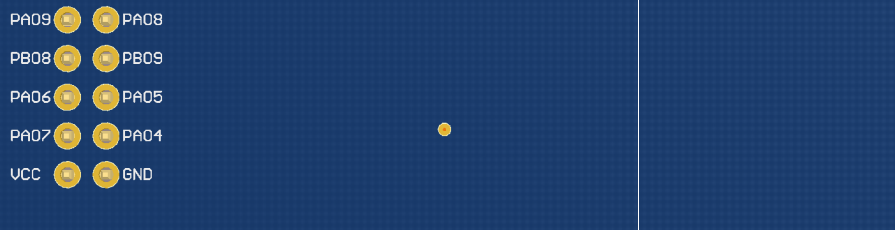
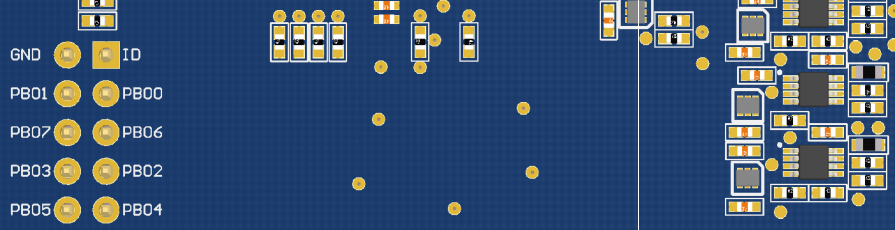
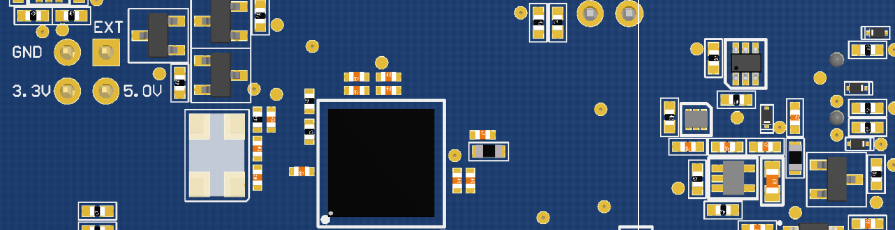
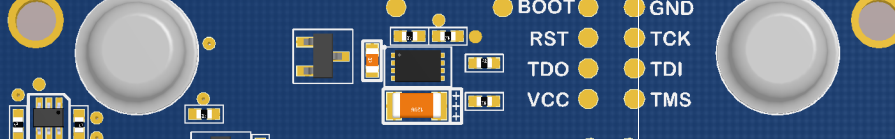
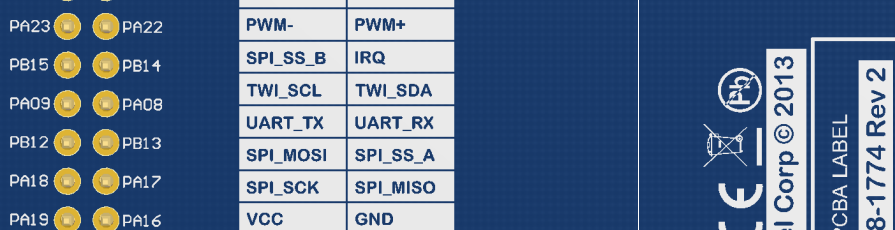
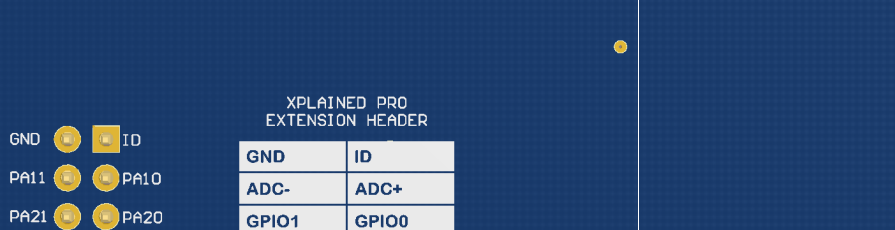
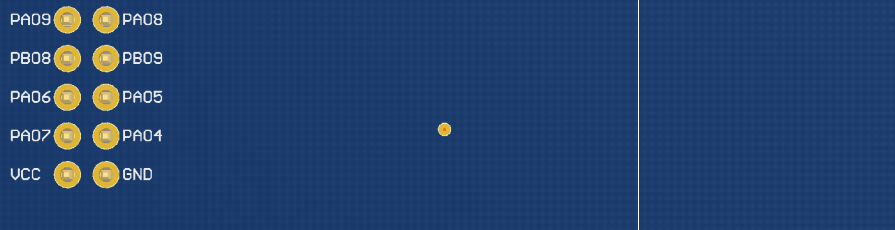
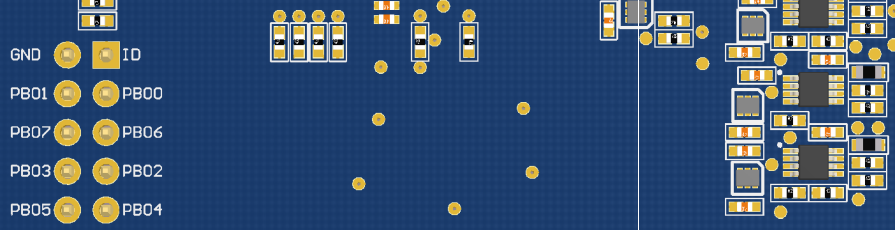
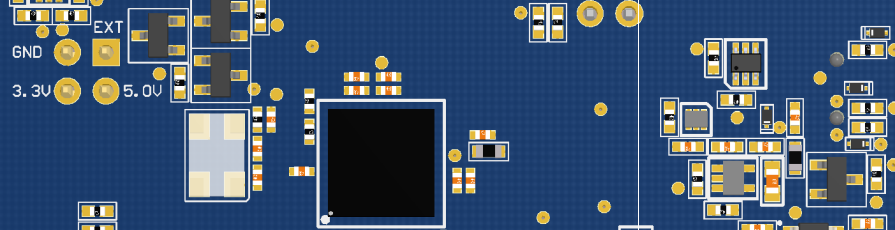
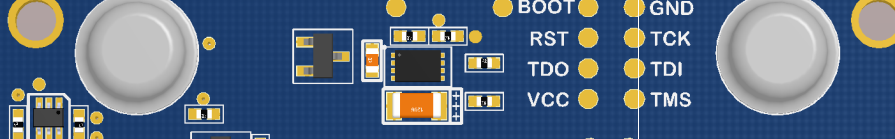
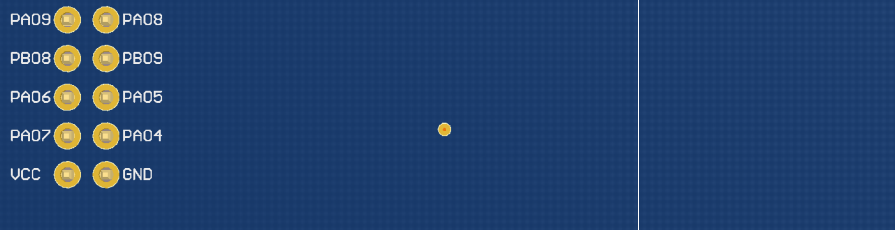
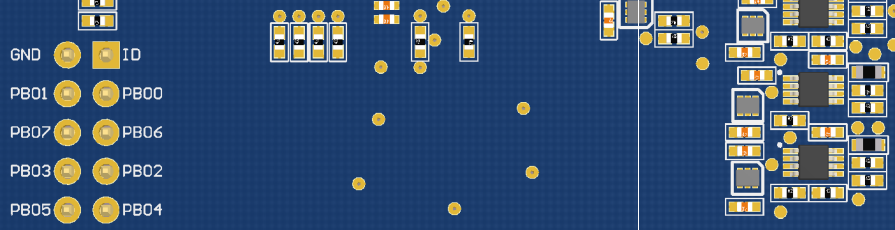
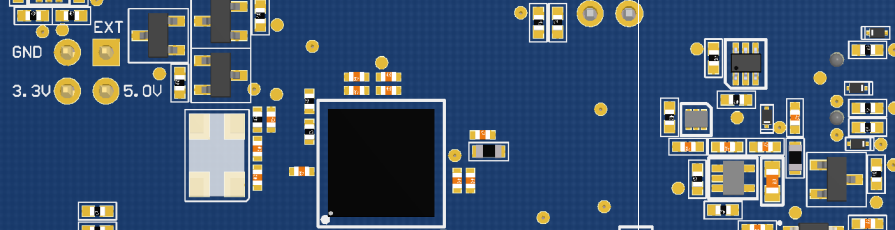
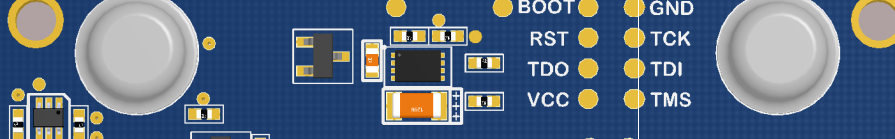
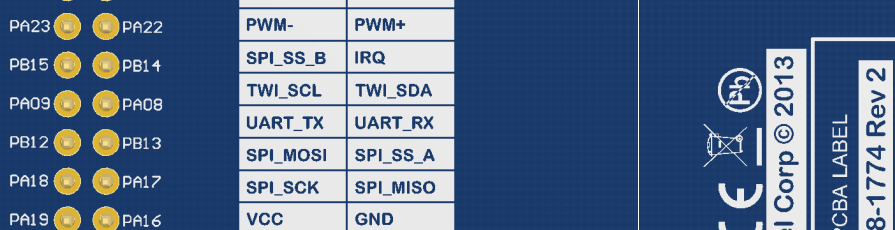
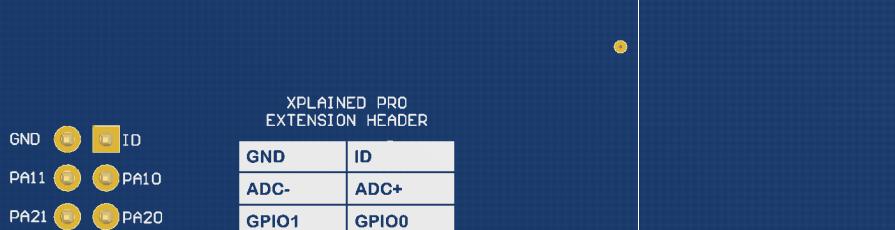
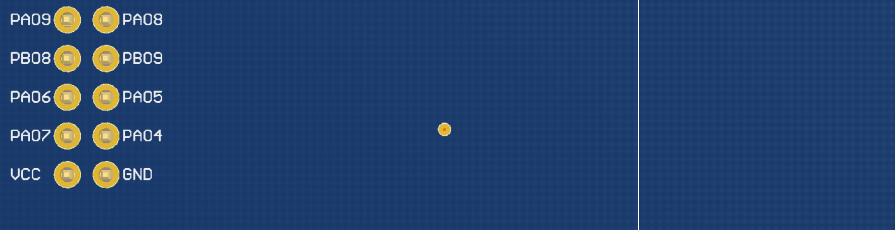
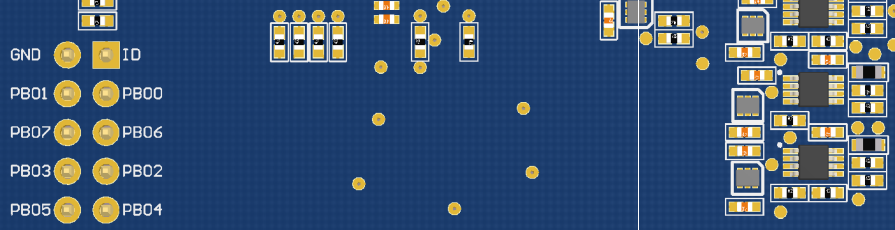
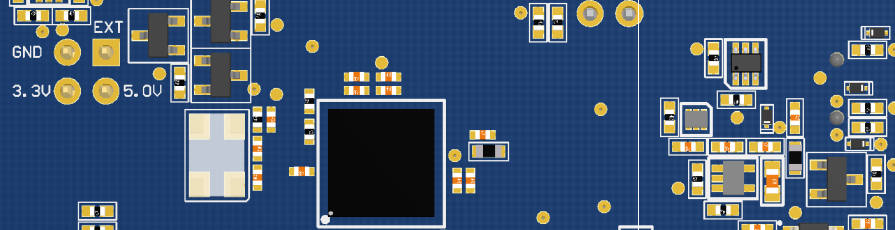
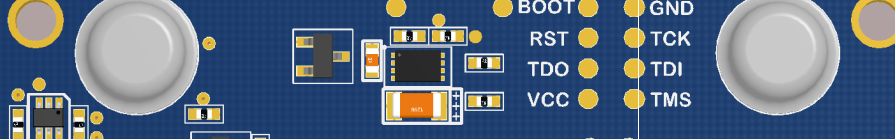
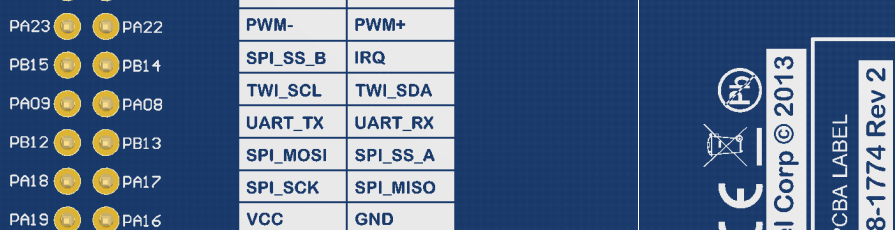
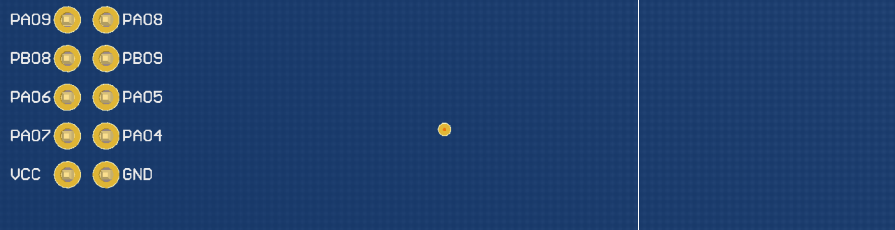
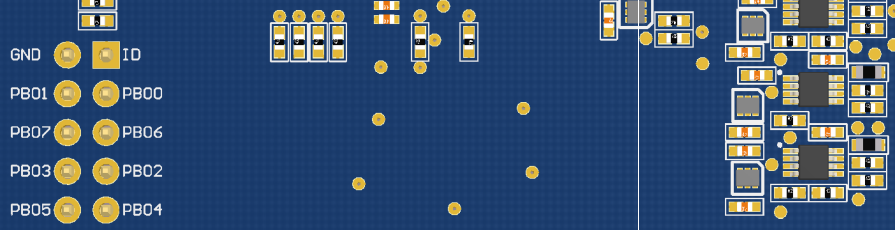
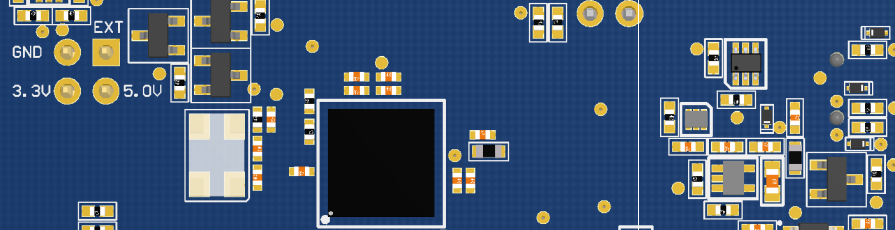
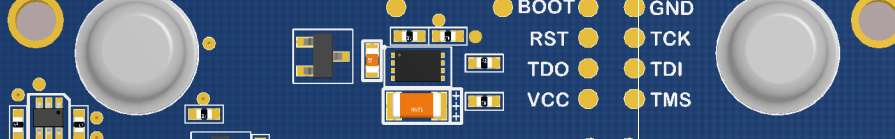
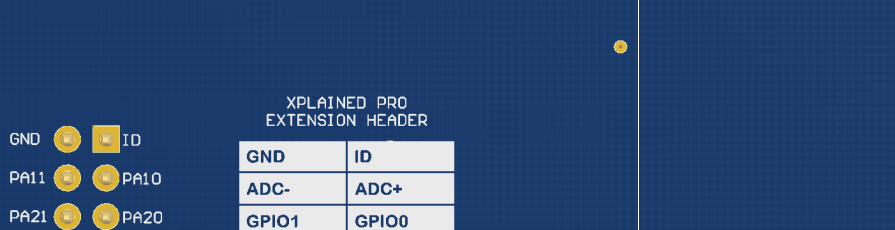
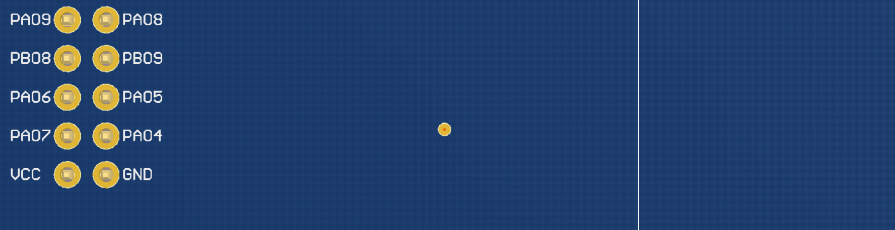
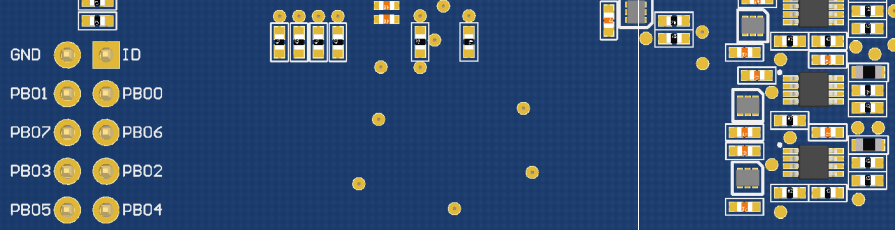
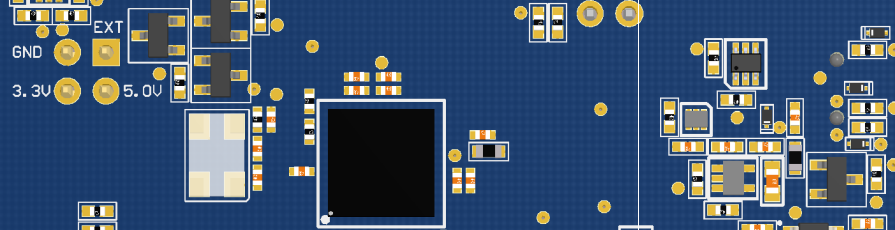
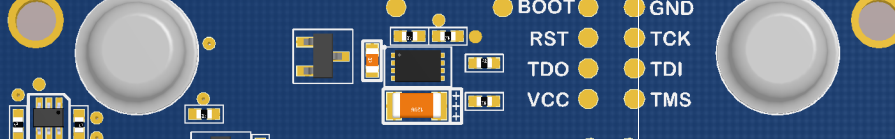
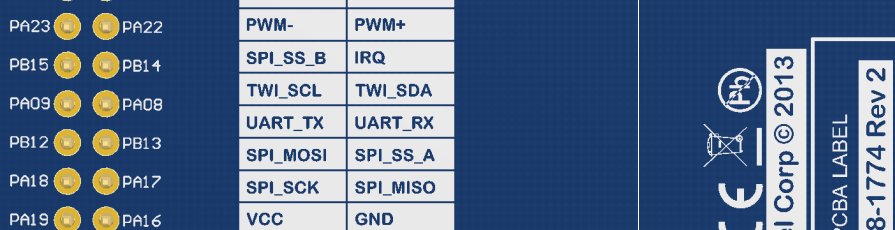
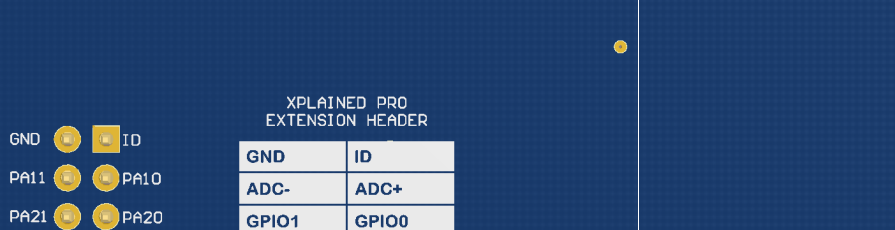
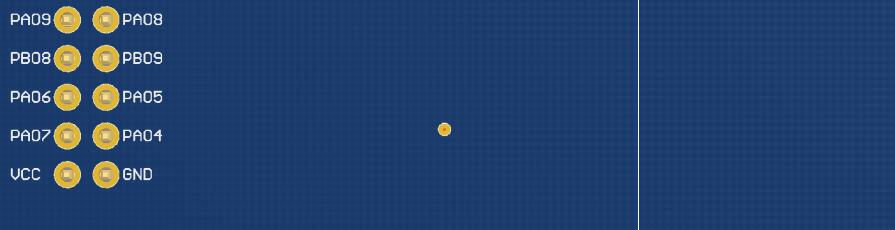
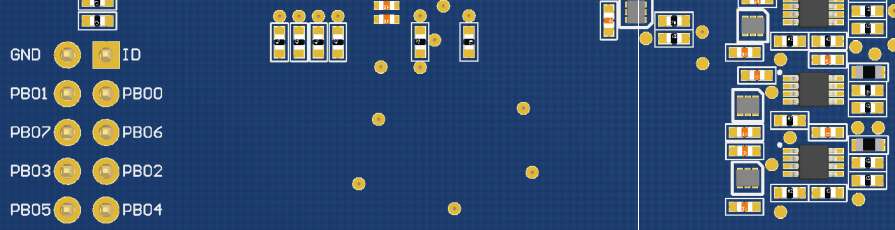
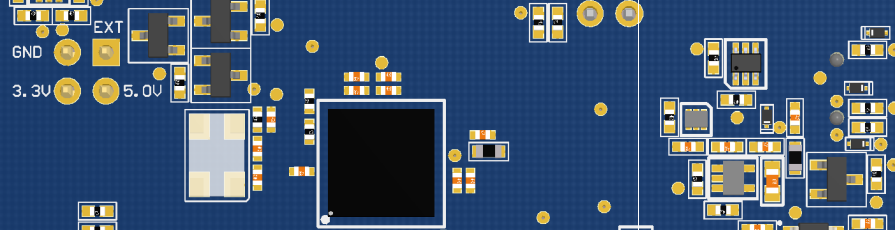
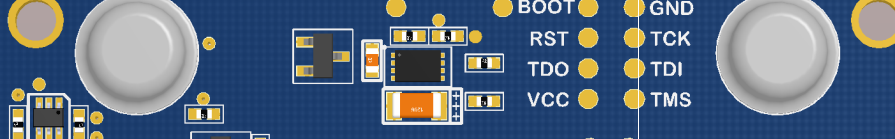
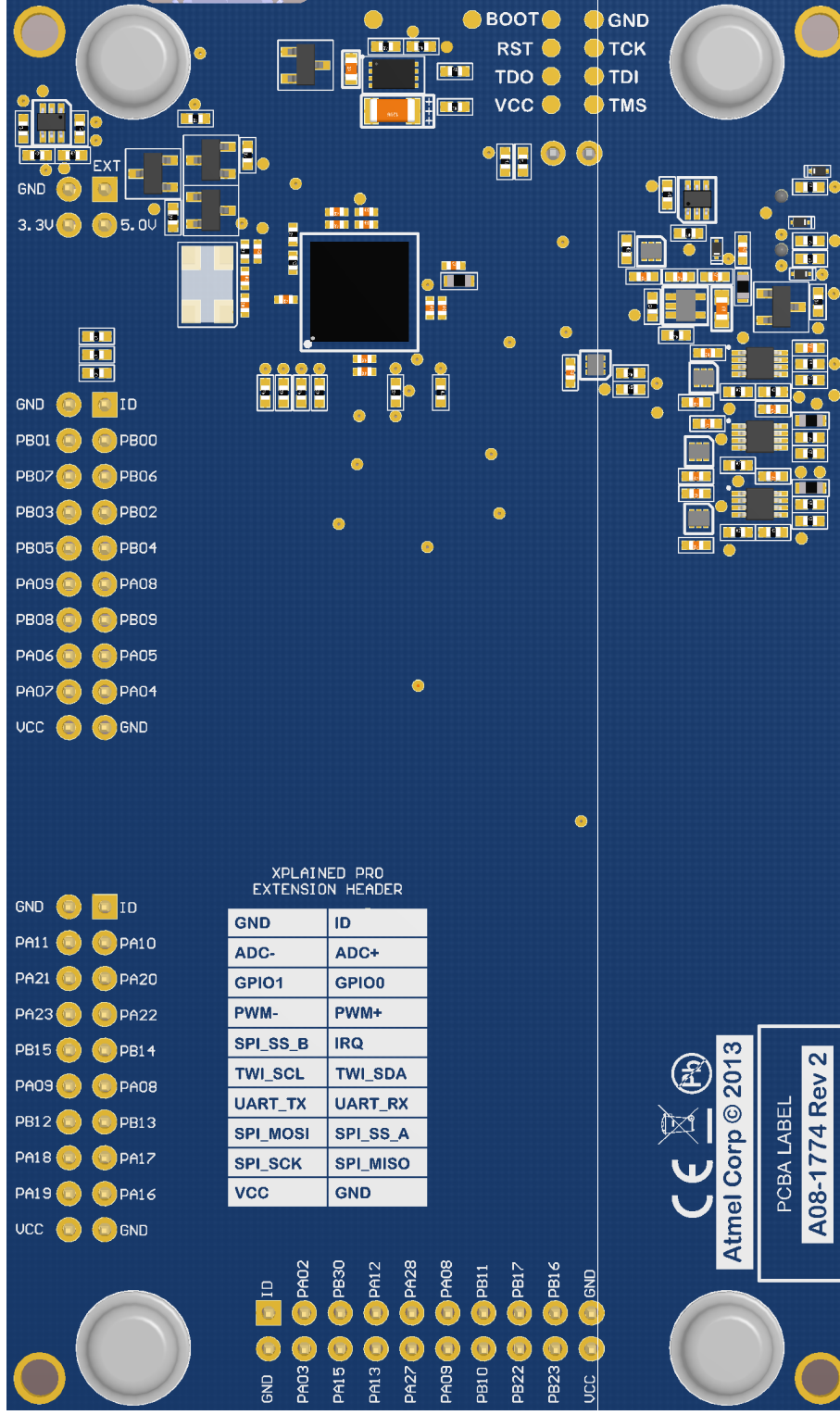
ID	GND	1
PB00	PB01	3
PB06	PB07	5
PB02	PB03	7
PB04	PB05	9
PA08	PA09	11
PB09	PB08	13
PA05	PA06	15
PA04	PA07	17
GND	VCC	19

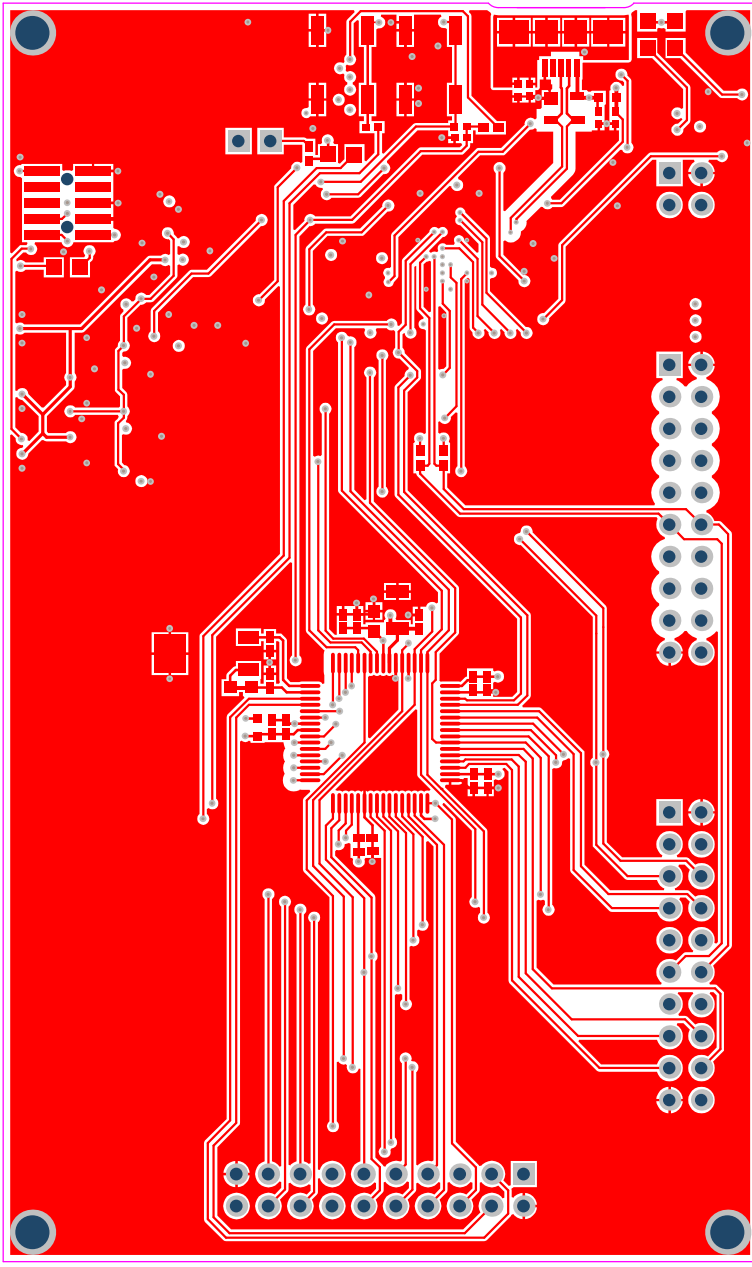
EXT2

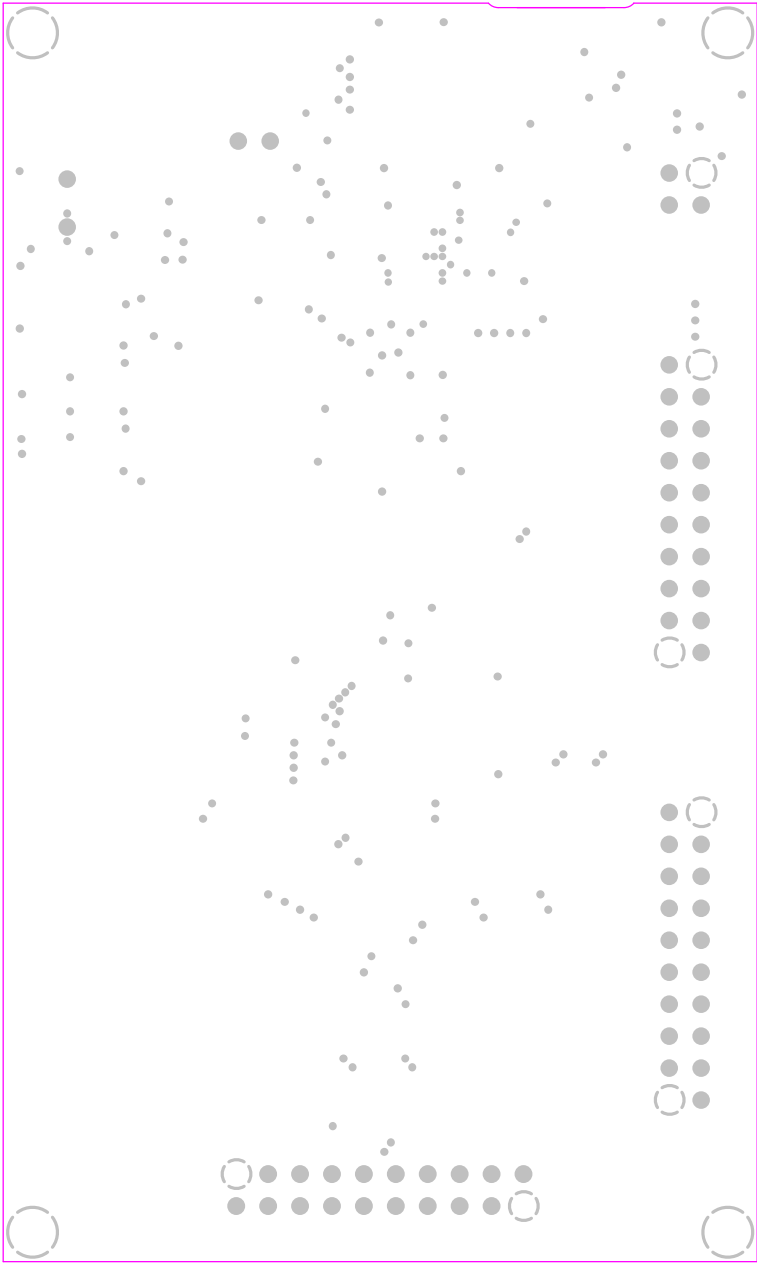
ID	GND	1
PA10	PA11	3
PA20	PA21	5
PA22	PA23	7
PB14	PB15	9
PA08	PA09	11
PB13	PB12	13
PA17	PA18	15
PA16	PA19	17
GND	VCC	19

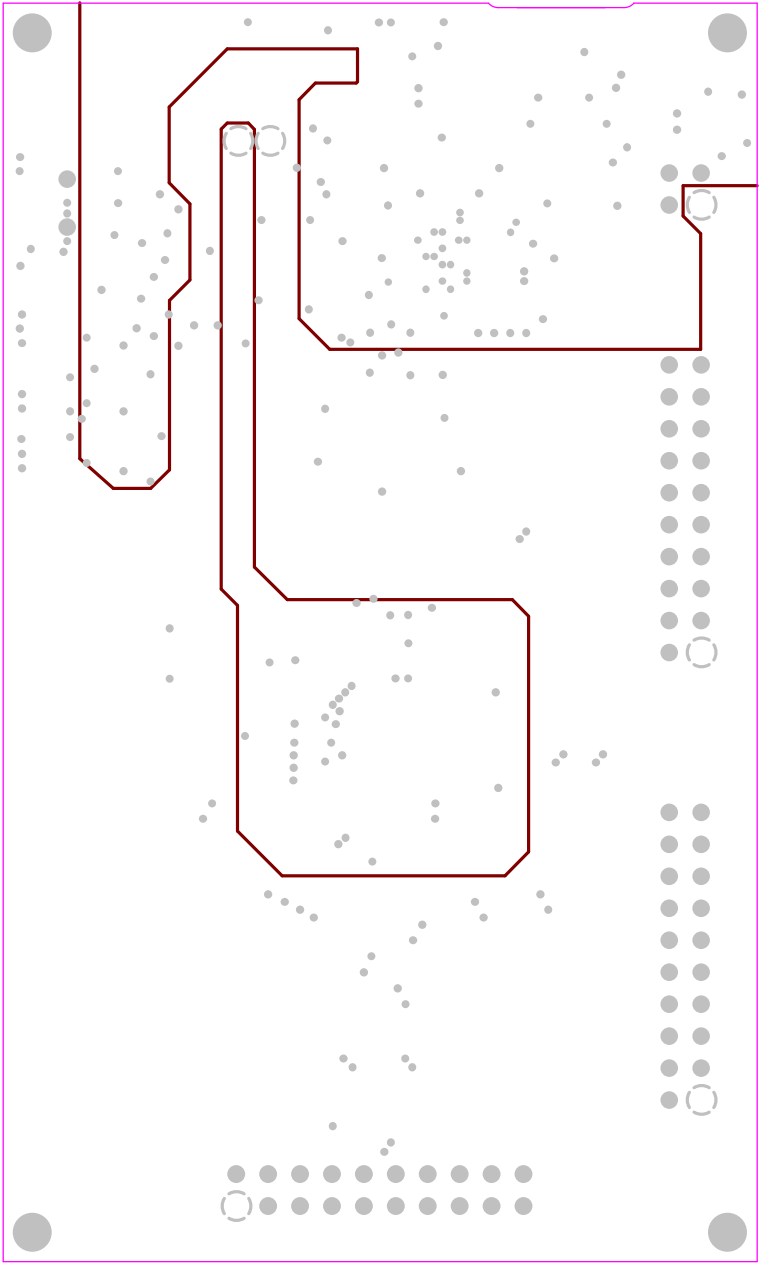
EXT3

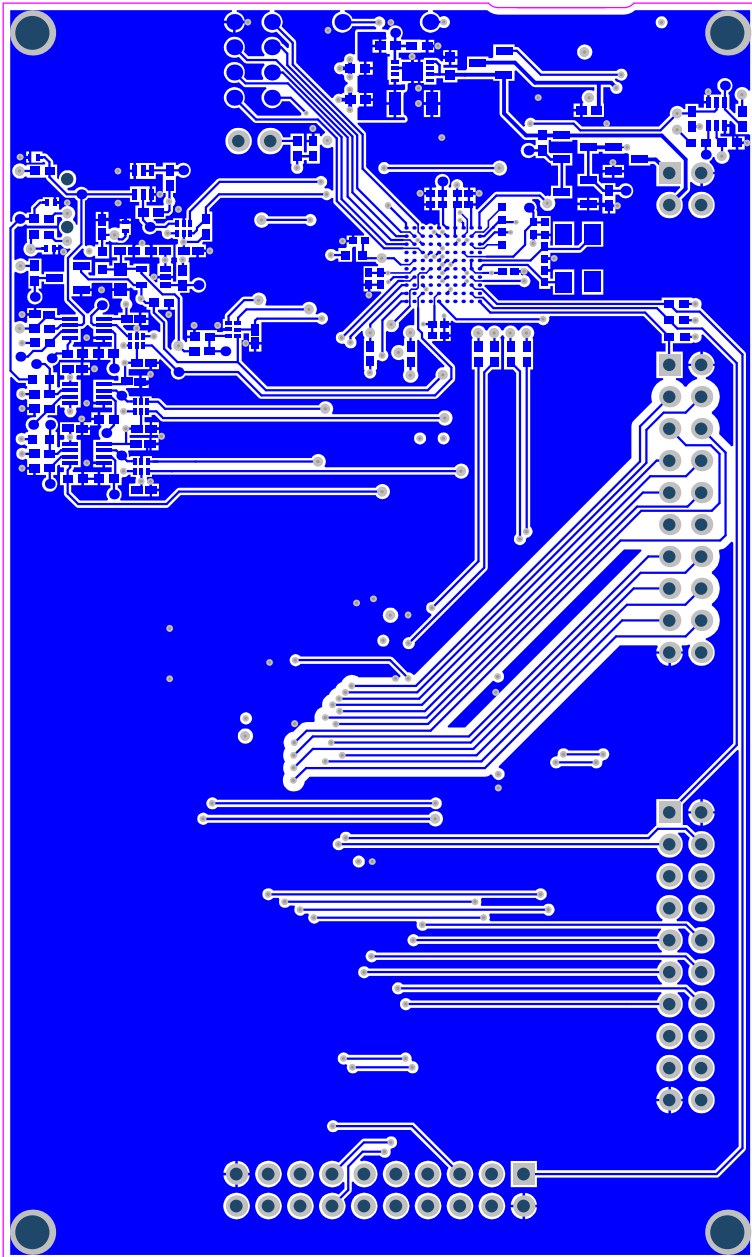
VCC	GND	19
PB23	PB16	17
PB22	PB17	15
PB10	PB11	13
PA09	PA08	11
PA27	PA28	9
PA13	PA12	7
PA15	PB30	5
PA03	PA02	3
GND	ID	1











Component list

Bill of Materials Fitted For Variant [Default_assembly] of Project [SAMD20_Xplained_Pro.PrjPCB] (No PCB Document Selected)



Source Data From: **SAMD20_Xplained_Pro.PrjPCB**
 Project: **SAMD20_Xplained_Pro.PrjPCB**
 Variant: **Default_assembly**

Report Date: 08.05.2013 10:02:58
 Print Date: 08.05.2013 10:02:53

Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100	1	10u	vishay	TR3A106K016C1700	SMD tantalum capacitor, ESR = 1.7, 3216-18 (EIA) 1206,
Fitted	C101	1	4.7uF	tdk	C1608X5R1A475K	Ceramic capacitor, SMD 0603, X5R, 10V, 10% (de31036)
Fitted	C301, C404, C410, C411, C412, C413	6	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C302, C303	2	6.8p			Ceramic capacitor, SMD 0402, NP0, 50V, +/-5%
Fitted	C305, C307, C309, C311, C317	5	33n	Murata	GRM155R71E333KA88D	Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Fitted	C306, C308, C310, C312, C314, C316, C500, C501, C502, C503, C504, C505, C506, C507, C508, C509, C511, C512, C513, C515	20	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C313, C514	2	1uF	Murata	GRM188R61E105K	Ceramic capacitor, SMD 0603, X5R, 25V, +/-10%
Fitted	C315	1	4.7uF10V	Kemet	T491A475K010AT	SMD tantalum capacitor, ESR = 5, 3216-18 (EIA) 1206, polarized
Fitted	C400, C401	2	22p			Ceramic capacitor, SMD 0402, NP0, 50V, +/-5%
Fitted	C402	1	10p			Ceramic capacitor, SMD 0402, NP0, 50V, +/-5%
Fitted	C405, C409, C414, C415	4	2.2uF	Kemet	C0402C225M9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-20%
Fitted	C406, C407, C408	3	1 nF C0G	Murata	GRM1555C1H102JA01D	Ceramic capacitor, SMD 0402, C0G, 50V, +/-5%
Fitted	D301, D401	2	EL17-21UYC/A2	Everlight	17-21UYC/S530-A3/TR8	LED, Yellow, Wave length=591nm, SMD 0805, +/-70°
Fitted	D400, D500	2	EL17-21SYGC	Everlight	EL17-21SYGC	LED, Green, Wave length=575nm, SMD 0805, +/-70°
Fitted	D402	1	PRTR5V0U2X	Philips	PRTR5V0U2X	Double rail-to-rail USB ESD protection diode
Fitted	D501, D502, D503, D504	4	VBUS051BD-HD1	vishay	VBUS051BD-HD1	Low capacitance ESD-Protection Diode in LLP1006-2L
Fitted	E1, E2, E3, E4	4	SJ-5076	3M	SJ-5076	2.8mm adhesive feet, diam 8.0mm
Fitted	FIXTURE1	1	Xplained PRO MCU board Jupiter Test Fixture	ESCA TEC	Xplained PRO MCU board Jupiter Test Fixture	Xplained PRO MCU board Jupiter Test Fixture
Fitted	FW1	1	EDBG secured firmware	ATMEL		EDBG secured firmware
Fitted	J100	1	P101-2*02RGF-139-ND		P101-2*02RGF-139-ND	Pin header, 2x2, Right Angle, 2.54mm, THT, Pin In Paste
Fitted	J101	1	Pin header 1x2 right angle	Pro-data International Corp	2213R-ZG	1x2 pin header, right angle, 2.54 mm pitch, through-hole
Fitted	J200, J201, J202	3	P101-2*10RGF-139-ND		P101-2*10RGF-139-ND	Pin header, 2x10, Right Angle, 2.54mm, THT, Pin In Paste
Fitted	J400	1	10104111-0001LF	PCI	10104111-0001LF	Micro USB AB Connector
Fitted	J500	1	FTSH-105-01-L-DV-K-A-P	SAMTEC	FTSH-105-01-L-DV-K-A-P	SAMTEC FTSH series 50-mil micro header (vertical)
Fitted	JS100	1	SNT-100-BK-G	SAMTEC	SNT-100-BK-G	Jumper cap for 2.54mm pinheader
Fitted	L300, L401, L402	3	BLM18PG471SN1	Murata	BLM18PG471SN1	SMD RF inductor 0603, Z=4700Ohm (@100MHz), Max R(dc)=0.65Ohm, Max current=1A
Fitted	L500	1	BLM18PG471SN1	Murata	BLM18PG471SN1	SMD RF inductor 0603, Z=4700Ohm (@100MHz), Max R(dc)=0.65Ohm, Max current=1A
Fitted	L501, L503	2	BLM18BB221SN1	Murata	BLM18BB221SN1	SMD RF inductor 0603, Z=2200Ohm (@100MHz), Max R(dc)=0.65Ohm, Max current=200mA
Fitted	LABEL1	1	Label PCBA	ACT Logimark AS	505462	PCBA identification label PP Top White Gloss
Fitted	PCB1	1	SAMD20 Xplained Pro PCB			SAMD20 Xplained Pro PCB, 4 layer, 60mm x 100mm
Fitted	PCBADO C1	1	A09-1978 PCB A Files	ATMEL		SAMD20 Xplained Pro PCB A documentation
Fitted	Q100, Q101, Q103	3	IRLML6402PBF	International Rectifier	IRLML6402PBF	P-ch. MOSFET, -30V, -3.7A continuous RDS(ON)=0.05Ohm@VGS=4.5V, RDS(ON)=0.08Ohm@VGS=2.5V
Fitted	Q102, Q501	2	2N7002.215	NXP	2N7002.215	N-Channel MOSFET, 60V, 0.300A continuous, 1.2A Peak, RDS(ON) = 3.8Ohm@VGS=4.5V, VGS(th)<2.5V
Fitted	Q400, Q500	2	2N7002DW	Fairchild	2N7002DW	Dual N-Channel MOSFET, 60V, 115mA cont.RDS(ON) < 7.5 Ohm @50mA@5V, SOT-363
Fitted	R100	1	18k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R102	1	30k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R103, R300	2	100k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R104, R107, R410, R413	4	1M	KOA	RK73H1ETTP1004F	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R108, R425	2	0R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R109, R110, R500, R501, R502, R504, R506, R507, R510, R511, R512, R513, R514, R516, R517, R520, R525, R526, R527, R528	20	47k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R302, R304, R421, R422	4	39R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R303, R411, R412, R414, R416, R417, R418, R419, R420	9	330R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R305, R306	2	4.7k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R401, R402, R409	3	1k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R423	1	6.81k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R503	1	220R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R505, R508, R509	3	68R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	SW300, SW301	2	SKRAAKE010	ALPS	SKRAAKE010	6.2x6.2mm SMD tact sw itch, same as A08-0091 but less force is needed
Fitted	TEST1	1	SAMD20 Xplained Pro test	ATMEL		Fixture eggTest for SAMD20 Xplained Pro
Fitted	TESTDOC1	1	SAMD20 Xplained Pro Test Instructions	ATMEL		SAMD20 Xplained Pro Test Instructions
Fitted	U100	1	SPX3819R2-L/TR	Exar	SPX3819R2-L/TR	500mA LDO, ADJ, low noise, 8-DFN package
Fitted	U300	1	SAMD20J18A-AUT	ATMEL	SAMD20J18A-AUT	Atmel 32-bit RISC MCU
Fitted	U400	1	A132UC3A4256J-C1UR	ATMEL	A132UC3A4256J-C1UR	AVR 32-bit RISC MCU
Fitted	U500, U502, U503, U504, U508	5	SN74LVCTG3157DRYR	Texas Instruments	SN74LVCTG3157DRYR	SPDT analog sw itch or 2:1 multiplexer
Fitted	U501, U505, U506	3	SN74LVCT45DCURG4	Texas Instruments	SN74LVCT45DCURG4	Dual Voltage Level Translator SN74LVCT245
Fitted	U507	1	TPS22945DCKR	Texas Instruments	TPS22945DCKR	LOW-INPUT-VOLTAGE CURRENT-LIMITED LOAD SWITCH
Fitted	XC300	1	32.768kHz +/-20PPM 7pF SMD	Micro Crystal	MS1V-T1K 32.768kHz 7pF +/-20PPM1A	32k768 crystal, +/-20ppm, CL=7pF, max ESR 60kOhm, SMD
Fitted	XC400	1	12.0MHz	Fox Electronics	FQ5032B-12-C-C-C-200-1	Fox FQ5032B 12.0MHz SMD crystal 738B-12
Not	C403	0	4.7n			Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Not	R424	0	1M	KOA	RK73H1ETTP1004F	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted		158				

Approved

Notes