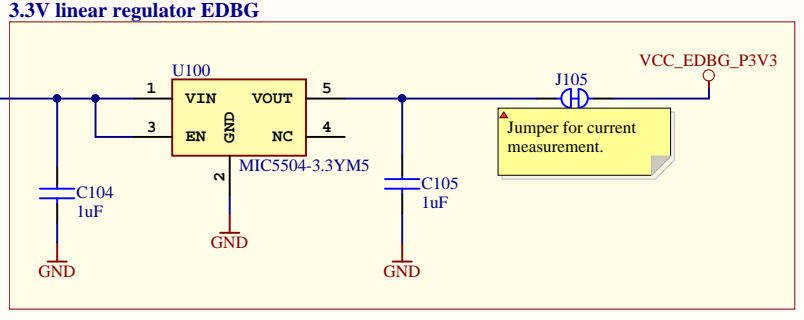
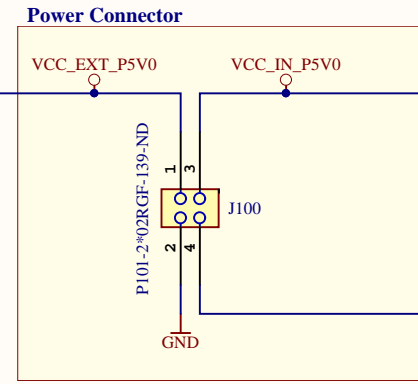
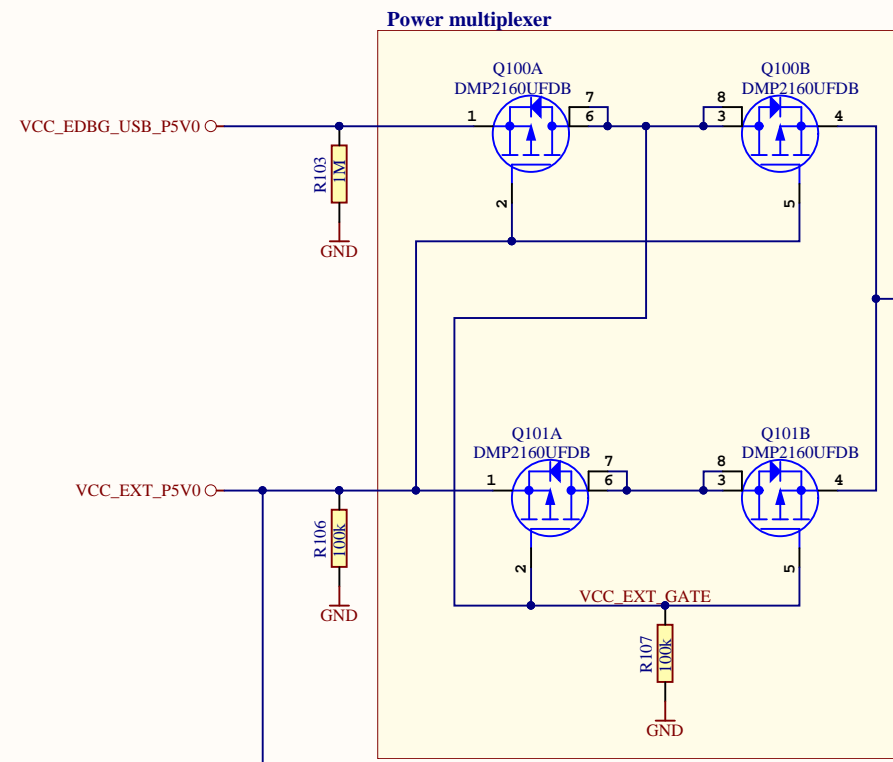


PCB1 A08-2581 SAM C21N Xplained Pro PCB	PCBADOC1 A12-1121	TESTDOC1 A12-1123	FW1 A11-0196
	TEST1 A11-0338	FIXTURE1 A13-0086	

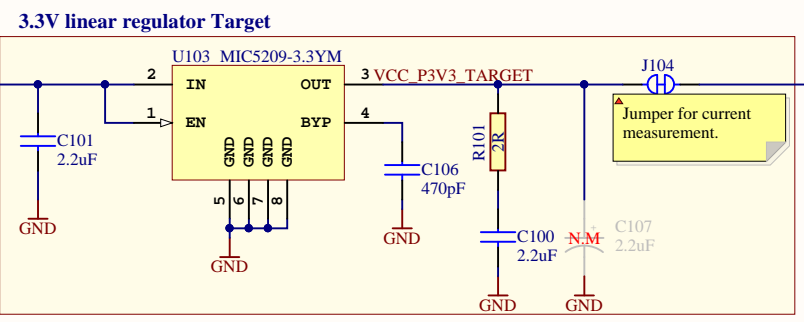
E1 RUBBER FEET SJ-5076	E2 RUBBER FEET SJ-5076
E3 RUBBER FEET SJ-5076	E4 RUBBER FEET SJ-5076

Drawn By: Microchip India	
Engineer: *	
Project Title ATSAMC21N-XPRO	
Sheet Title Top Level Schematics	
Size A3	PCB Assembly Number: A09-2682
	PCB Number: A08-2581
	PCBA Revision: 4
	PCB Revision: 2
File: SAMC21N_Xplained_Pro_TopLevel.SchDoc	
	Date: 4/10/2017
	Page: 1 of 9

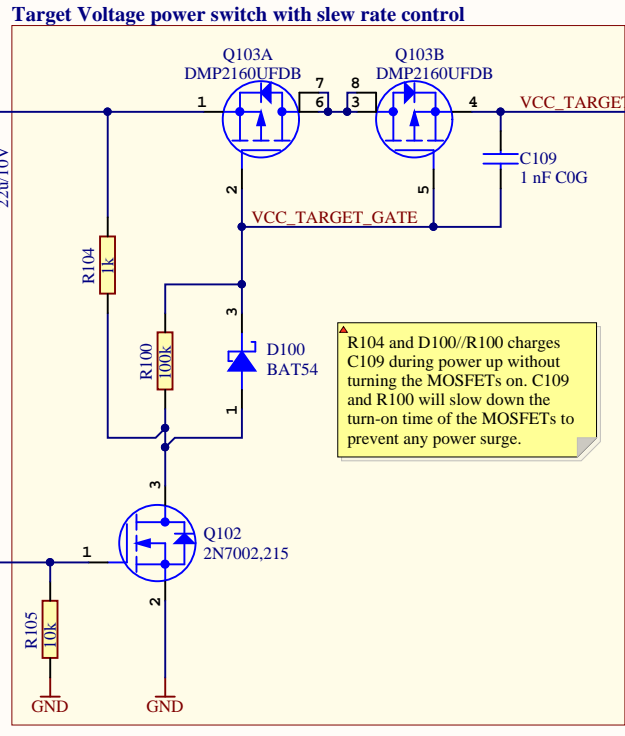
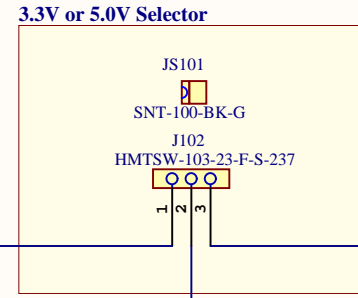




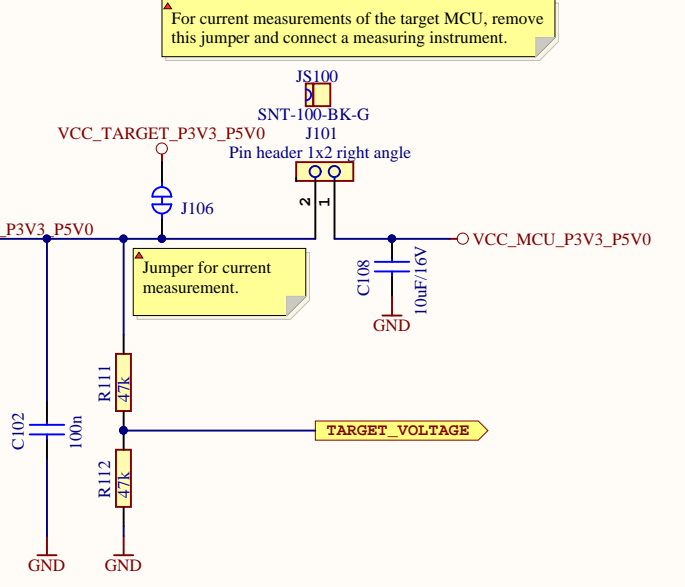
Iout max = 300mA
 Accuracy 2%
 Low noise: 175uVrms (10 Hz to 100 kHz)
 Dropout 160mV at full load
 Quiescent current 38uA (no load)
 Current limit max 630mA
 Thermal shutdown



500mA LDO voltage regulator
 Accuracy 1%
 Dropout 350mV at full load
 Current limit 700 mA
 Thermal shutdown



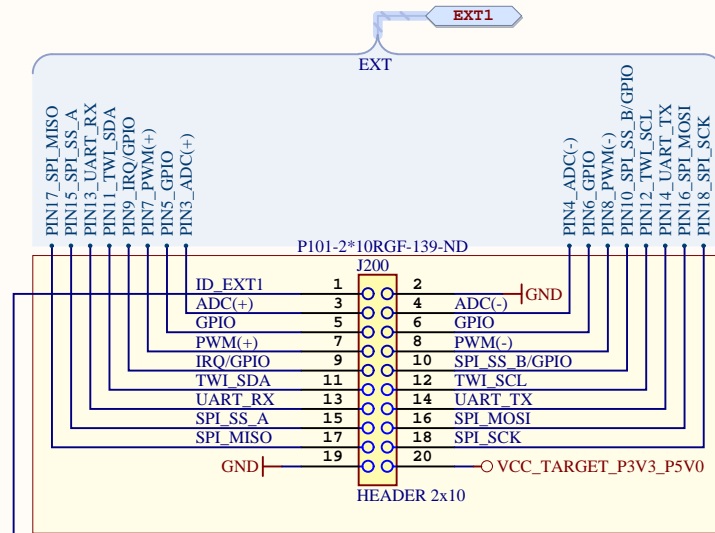
R104 and D100/R100 charges C109 during power up without turning the MOSFETs on. C109 and R100 will slow down the turn-on time of the MOSFETs to prevent any power surge.



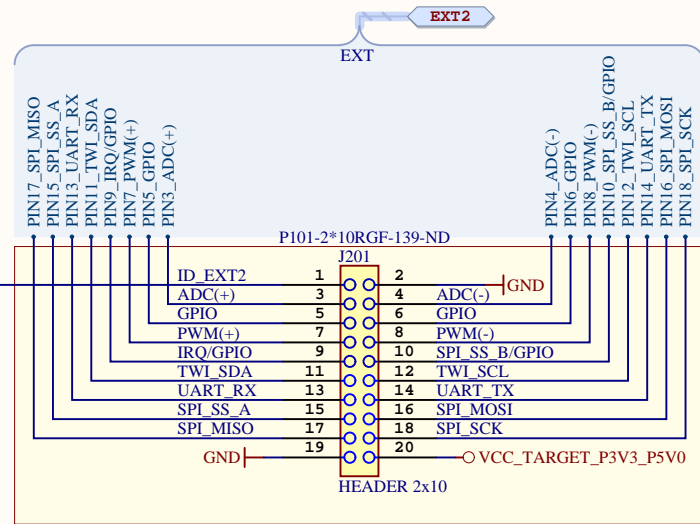
For current measurements of the target MCU, remove this jumper and connect a measuring instrument.

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 than 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_EDBG_P3V3
 Regulated 3.3V from VCC_P5V0 for EDBG
VCC_P3V3
 Regulated 3.3V from VCC_P5V0
VCC_TARGET_P3V3_P5V0
 Target supply voltage (target MCU and peripherals)

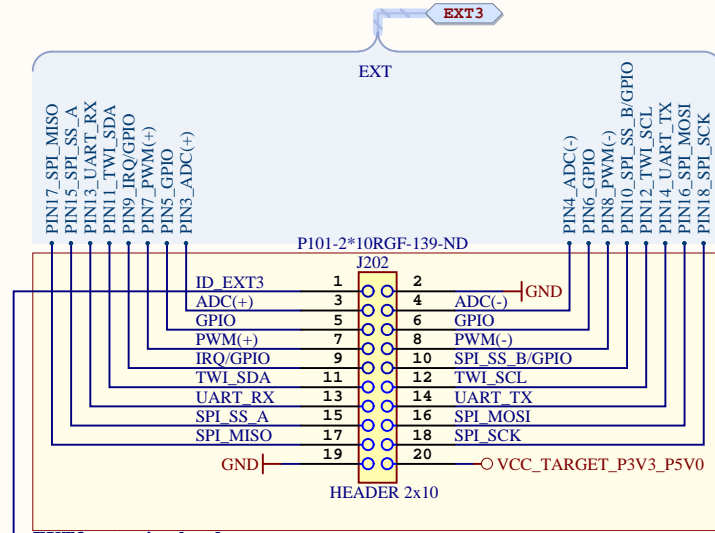
Drawn By: Microchip India Engineer: *			
Project Title ATSAMC21N-XPRO Sheet Title Power supply			
Size A3	PCB Assembly Number: A09-2682	PCB Revision: 4	Designed with
PCB Number: A08-2581	PCB Revision: 2	Date: 4/10/2017	Altium.com
File: SAMC21N_Xplained_Pro_dual_input_power_supply.SchDoc			Page: 2 of 9



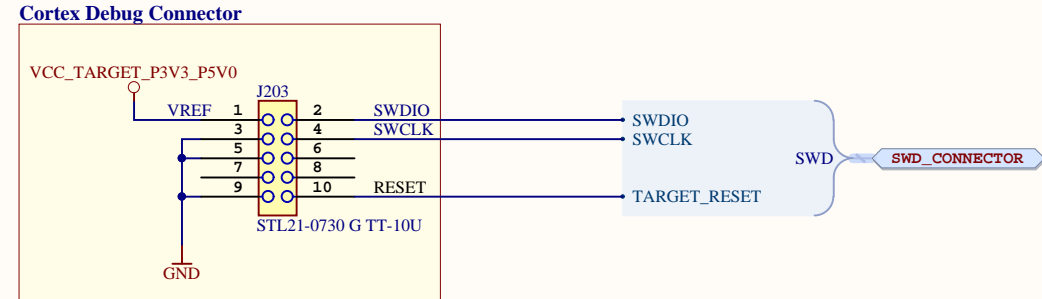
EXT1 extension header



EXT2 extension header

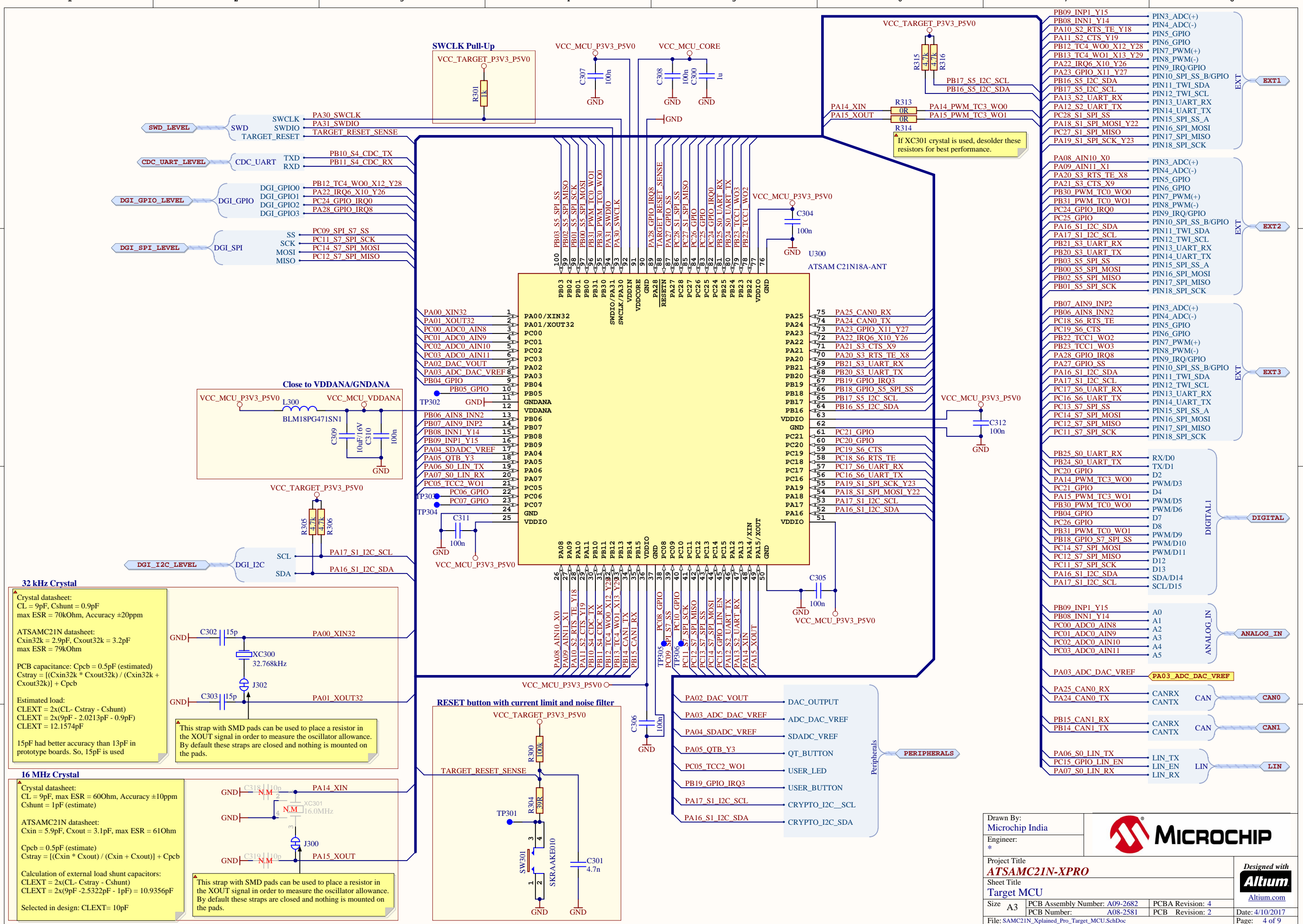


EXT3 extension header



Cortex Debug Connector

Drawn By: Microchip India			
Engineer: *			
Project Title ATSAMC21N-XPRO		Designed with 	
Sheet Title Extension connectors			
Size A3	PCB Assembly Number: A09-2682	PCBA Revision: 4	Date: 4/10/2017
File: SAMC21N_Xplained_Pro_Connectors.SchDoc		PCB Revision: 2	Page: 3 of 9



32 kHz Crystal

Crystal datasheet:
 $CL = 9pF$, $C_{shunt} = 0.9pF$
 $max ESR = 70k\Omega$, Accuracy $\pm 20ppm$

ATSAMC21N datasheet:
 $C_{xin32k} = 2.9pF$, $C_{xout32k} = 3.2pF$
 $max ESR = 79k\Omega$

PCB capacitance: $C_{pcb} = 0.5pF$ (estimated)
 $C_{stray} = [(C_{xin32k} * C_{xout32k}) / (C_{xin32k} + C_{xout32k})] + C_{pcb}$

Estimated load:
 $CLEXT = 2x(CL - C_{stray} - C_{shunt})$
 $CLEXT = 2x(9pF - 2.0213pF - 0.9pF)$
 $CLEXT = 12.1574pF$

15pF had better accuracy than 13pF in prototype boards. So, 15pF is used

16 MHz Crystal

Crystal datasheet:
 $CL = 9pF$, $max ESR = 60\Omega$, Accuracy $\pm 10ppm$
 $C_{shunt} = 1pF$ (estimate)

ATSAMC21N datasheet:
 $C_{xin} = 5.9pF$, $C_{xout} = 3.1pF$, $max ESR = 61\Omega$

$C_{pcb} = 0.5pF$ (estimate)
 $C_{stray} = [(C_{xin} * C_{xout}) / (C_{xin} + C_{xout})] + C_{pcb}$

Calculation of external load shunt capacitors:
 $CLEXT = 2x(CL - C_{stray} - C_{shunt})$
 $CLEXT = 2x(9pF - 2.5322pF - 1pF) = 10.9356pF$

Selected in design: $CLEXT = 10pF$

This strap 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.

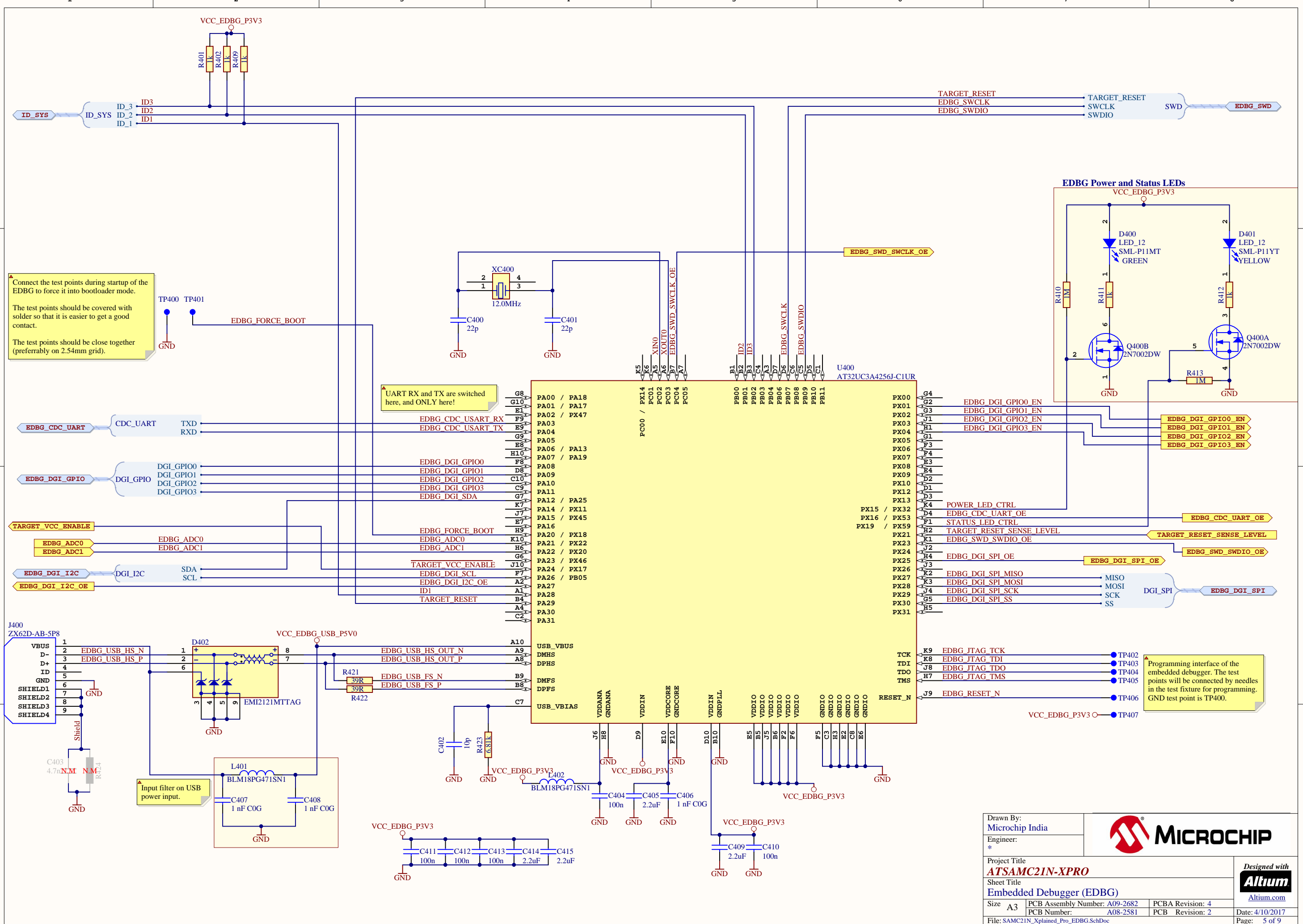
This strap with SMD pads can be used to place a resistor in the XOUT signal in order to measure the oscillator allowance. By default these straps are closed and nothing is mounted on the pads.

If XC301 crystal is used, desolder these resistors for best performance.

Drawn By: Microchip India		
Engineer: *		
Project Title ATSAMC21N-XPRO		
Sheet Title Target MCU		
Size A3	PCB Assembly Number: A09-2682	PCBA Revision: 4
	PCB Number: A08-2581	PCB Revision: 2
File: SAMC21N_Xplained_Pro_Target_MCU.SchDoc		Page: 4 of 9

Designed with

Altium.com

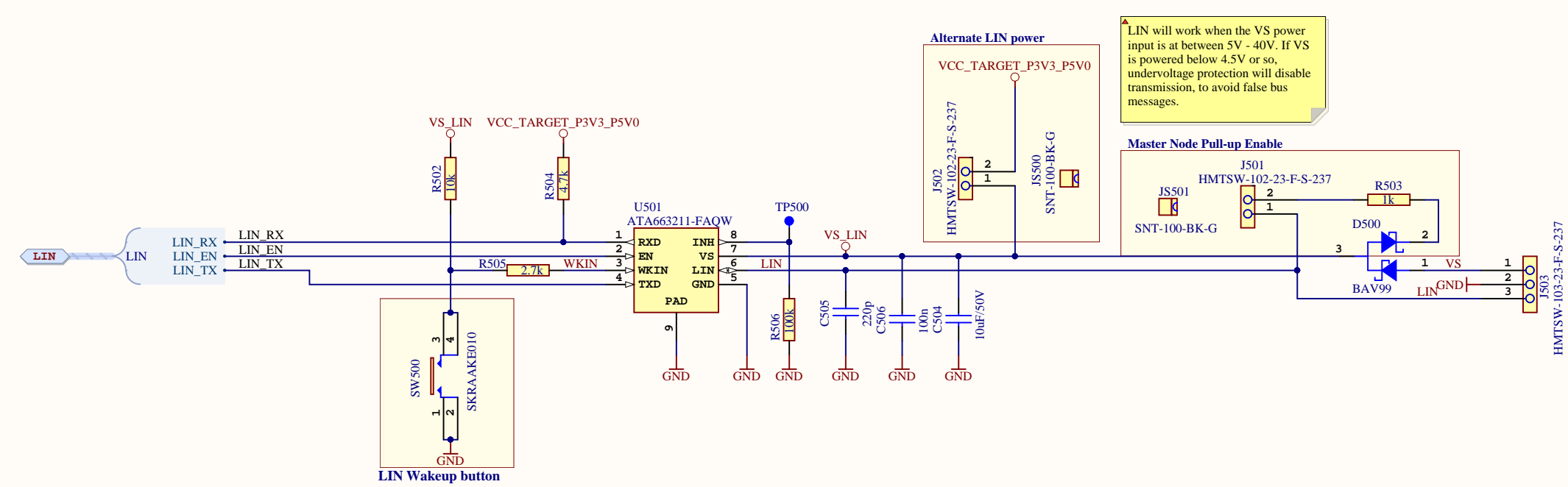
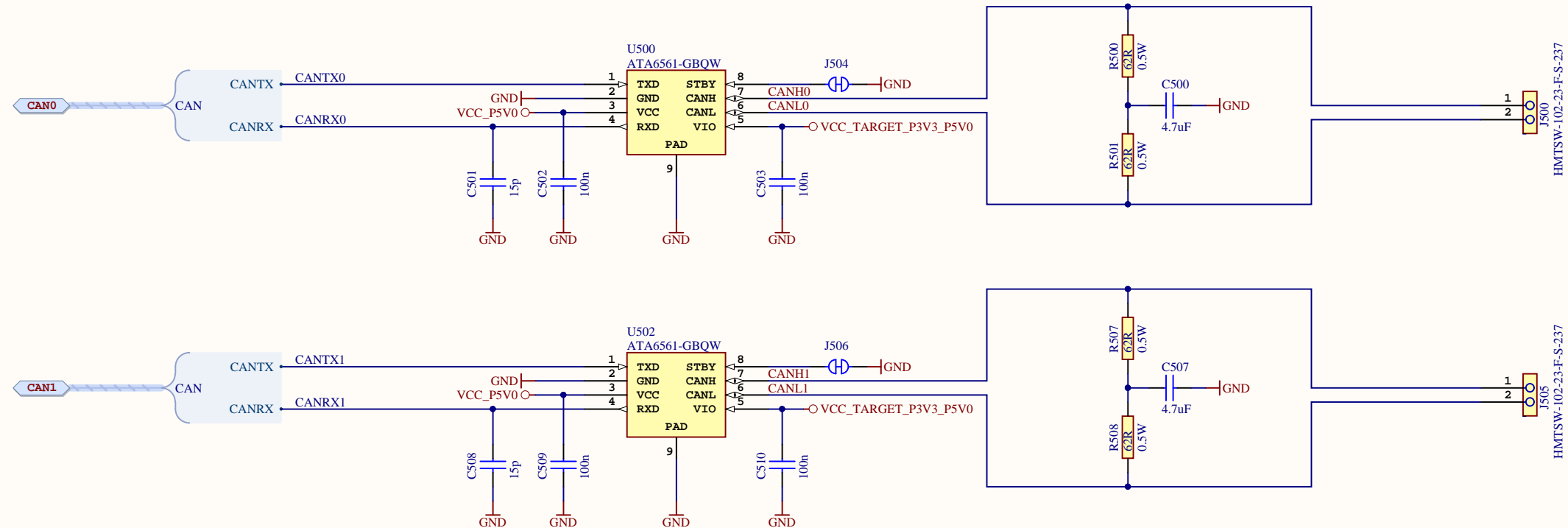


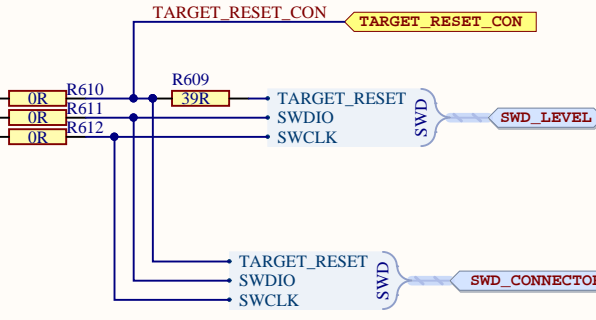
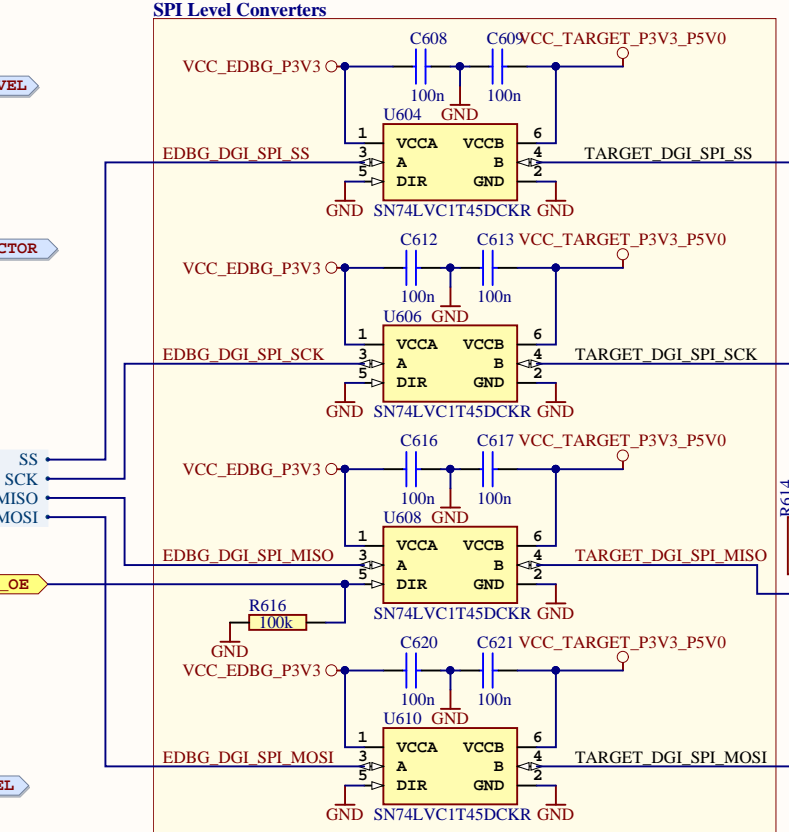
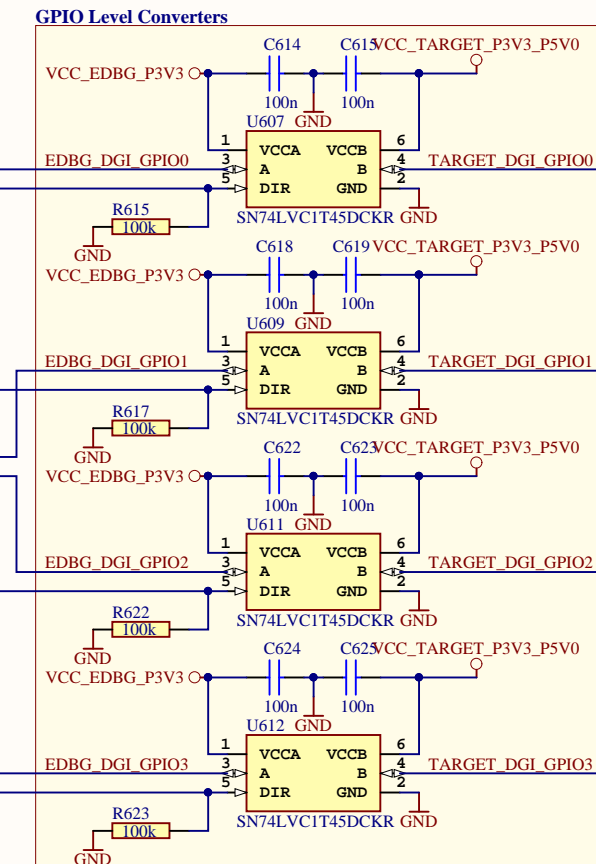
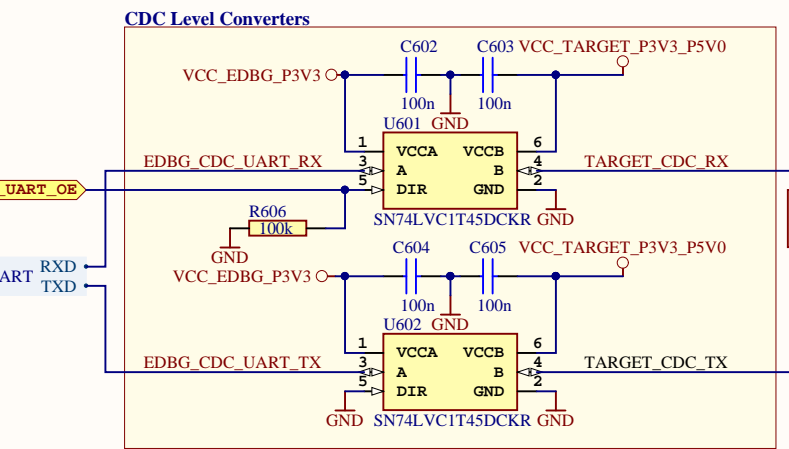
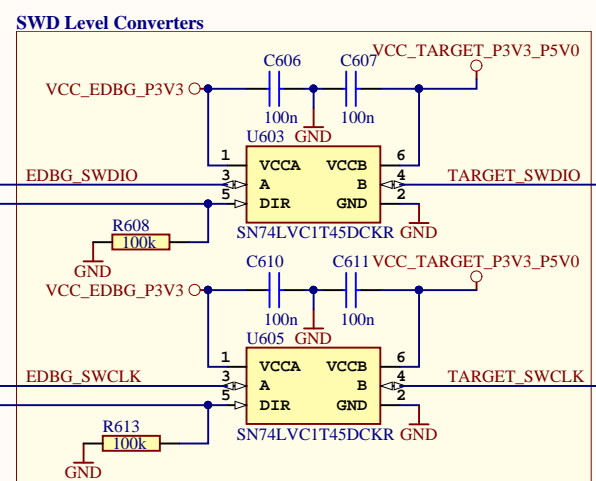
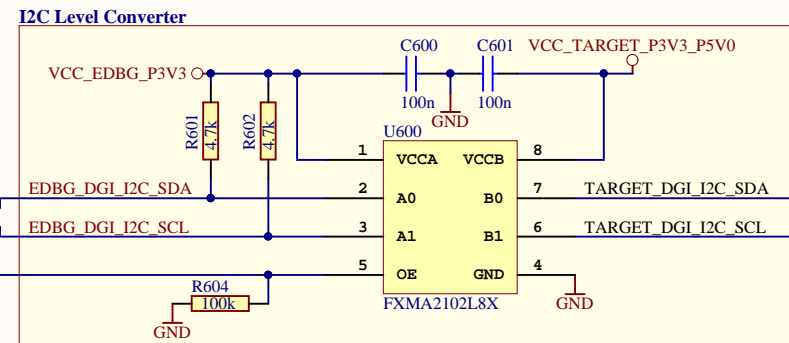
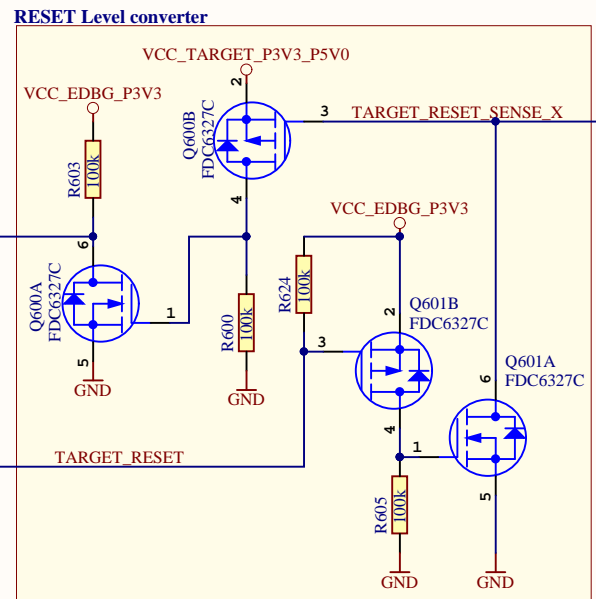
Connect the test points during startup of the EDBG to force it into bootloader mode. The test points should be covered with solder so that it is easier to get a good contact. The test points should be close together (preferably on 2.54mm grid).

UART RX and TX are switched here, and ONLY here!

Programming interface of the embedded debugger. The test points will be connected by needles in the test fixture for programming. GND test point is TP400.

Drawn By: Microchip India Engineer: *		
Project Title ATSAM21N-XPRO Sheet Title Embedded Debugger (EDBG)		
Size A3	PCB Assembly Number: A09-2682	PCBA Revision: 4
File: SAMC21N_Xplained_Pro_EDBG.SchDoc		PCB Number: A08-2581 PCB Revision: 2
		Date: 4/10/2017 Page: 5 of 9

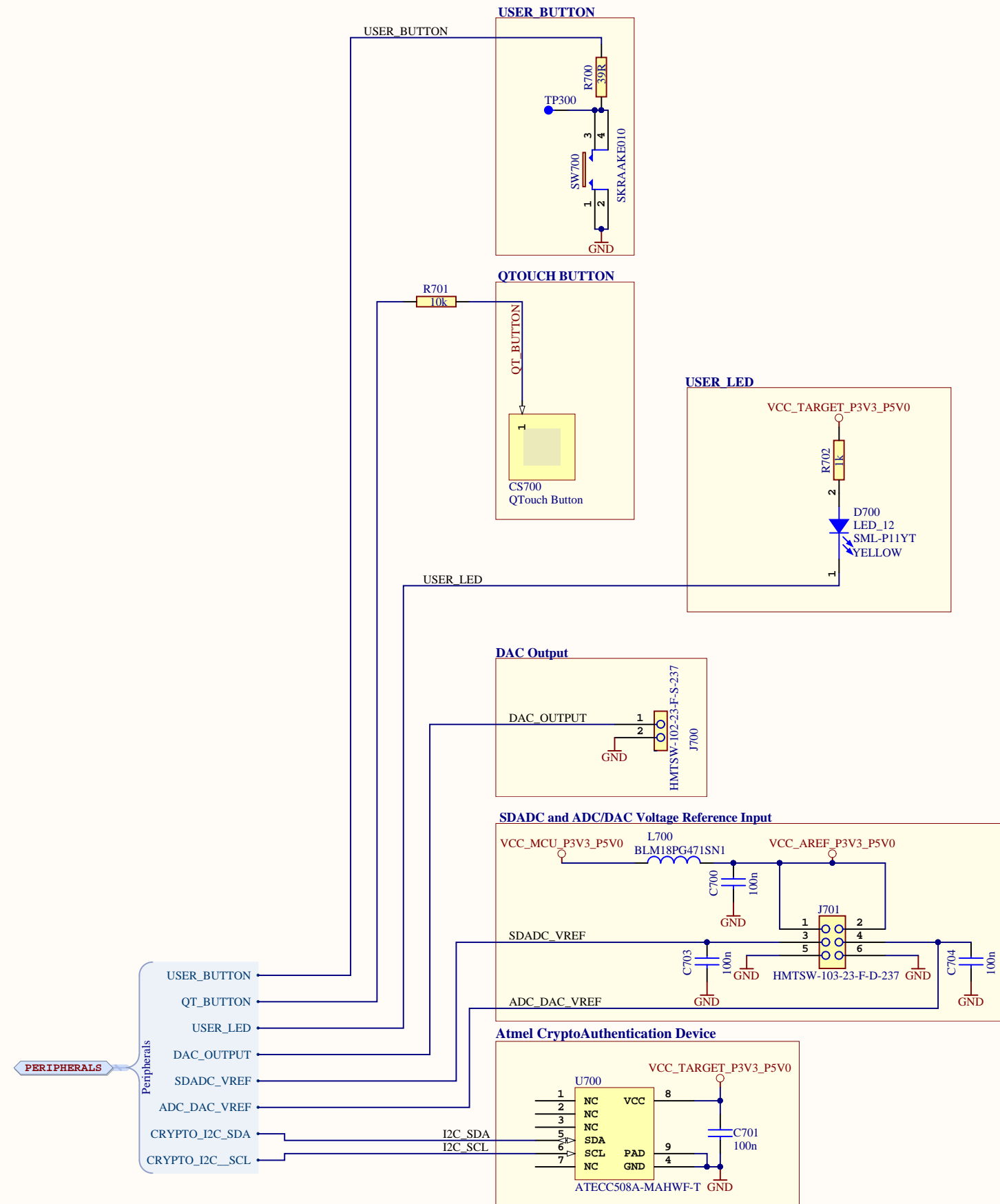




Drawn By: Microchip India
 Engineer: *

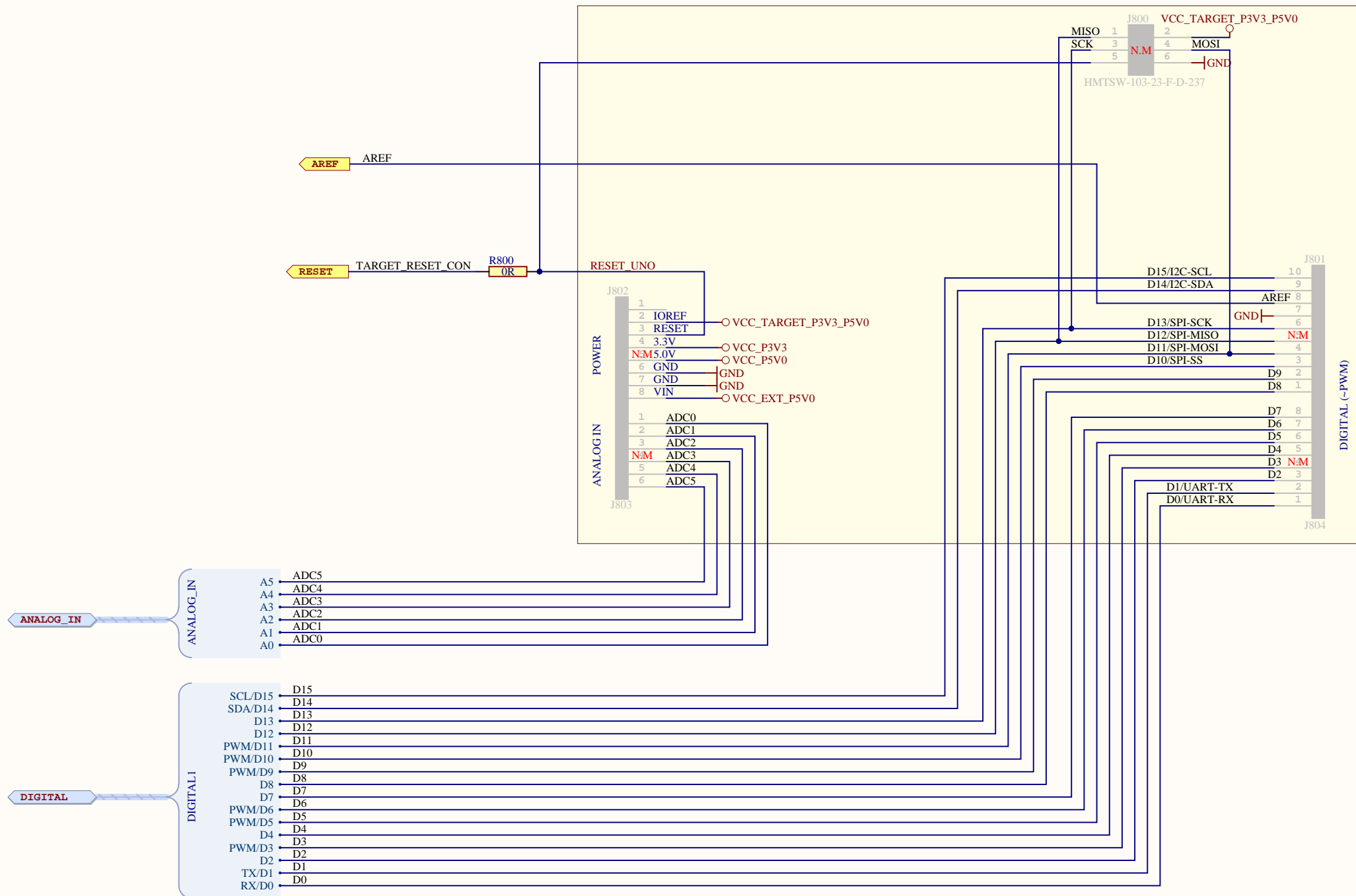
Project Title: **ATSAMC21N-XPRO**
 Sheet Title: **Data Level Converters**

Size A3 PCB Assembly Number: A09-2682 PCBA Revision: 4
 PCB Number: A08-2581 PCB Revision: 2 Date: 4/10/2017
 File: SAMC21N_Xplained_Pro_Level_Converters.SchDoc Page: 7 of 9



Drawn By: Microchip India		
Engineer: *		
Project Title ATSAMC21N-XPRO		<i>Designed with</i> Altium Altium.com
Sheet Title Peripherals		
Size A3	PCB Assembly Number: A09-2682	PCBA Revision: 4
	PCB Number: A08-2581	PCB Revision: 2
File: SAMC21N_Xplained_Pro_Peripherals.SchDoc		Date: 4/10/2017
		Page: 8 of 9

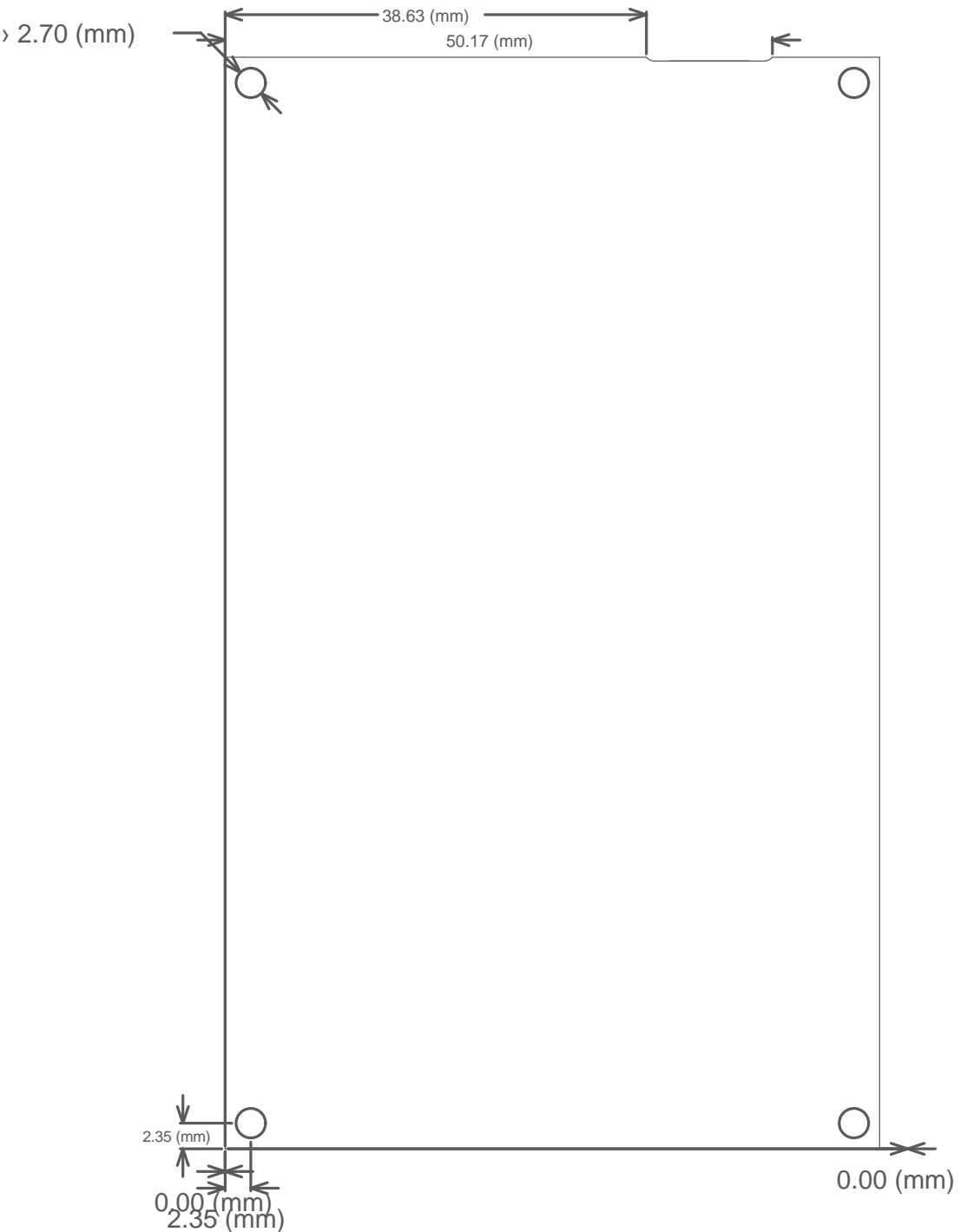
ARDUINO UNO COMPATIBLE HEADERS

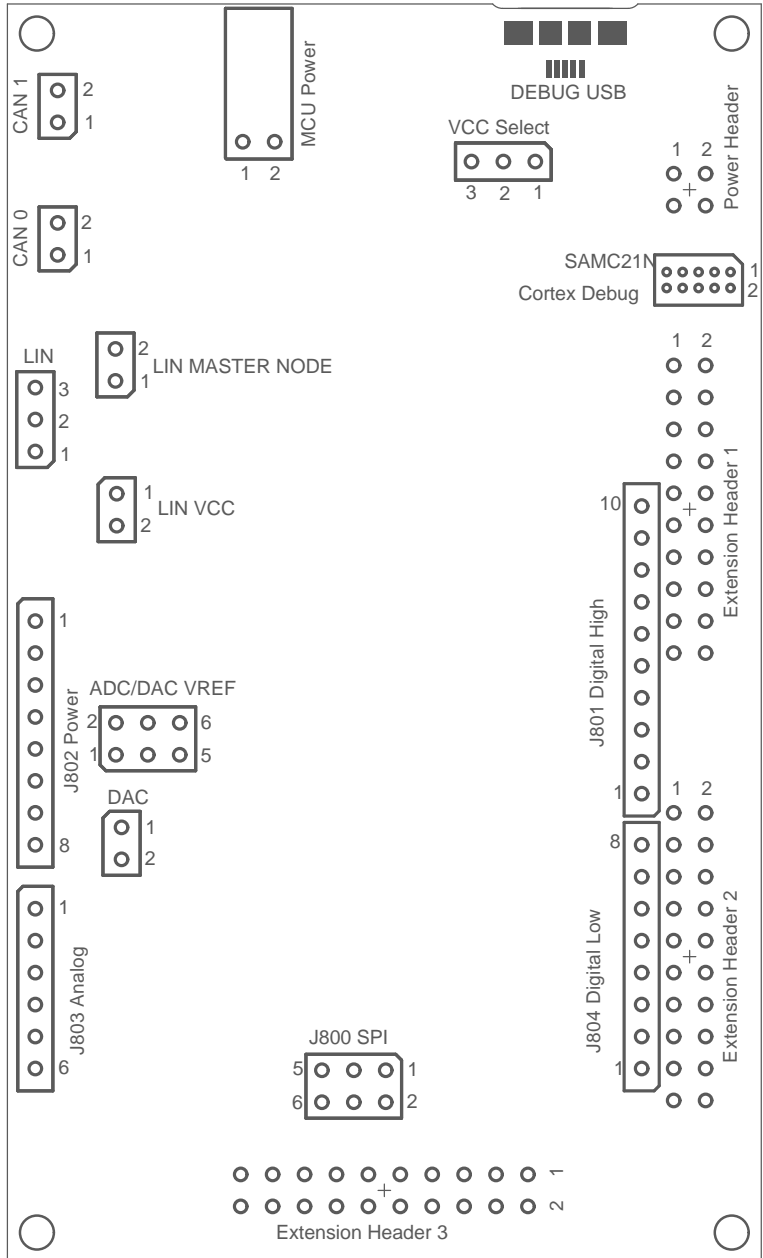


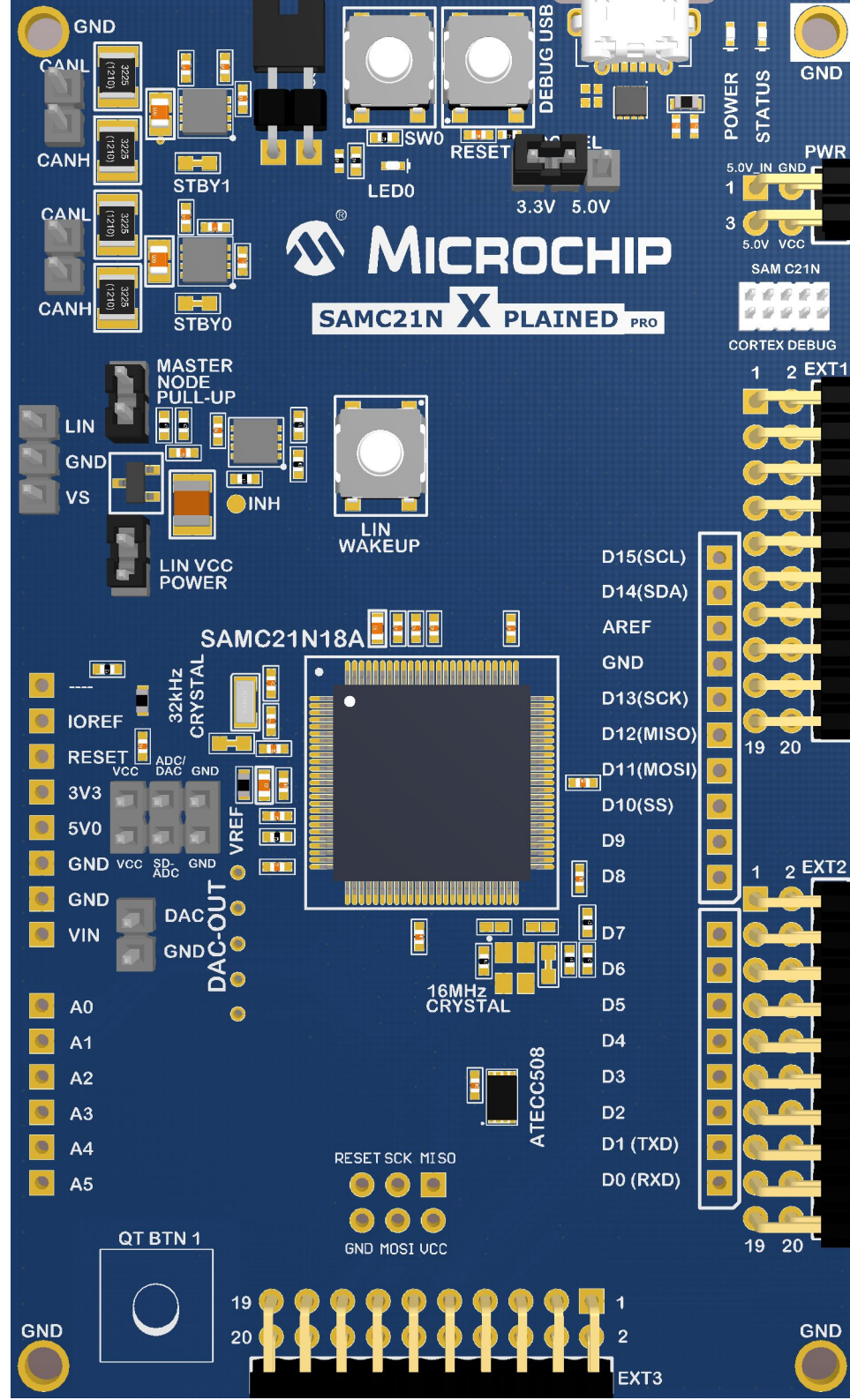
Drawn By: Microchip India		
Engineer: *		
Project Title ATSAMC21N-XPRO		
Sheet Title Arduino Uno interface connectors		
Size A3	PCB Assembly Number: A09-2682	PCBA Revision: 4
	PCB Number: A08-2581	PCB Revision: 2
File: SAMC21N_Xplained_Pro_Arduino_Connectors.SchDoc		Date: 4/10/2017
		Page: 9 of 9

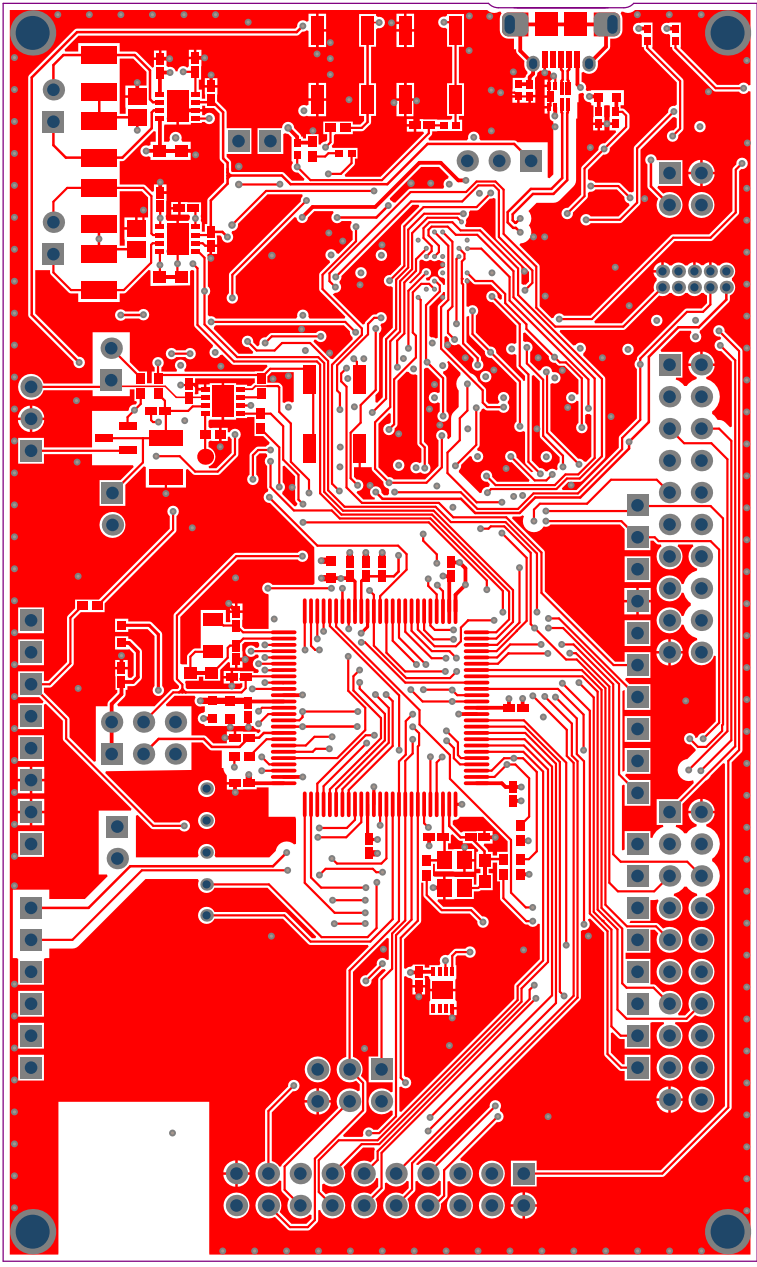


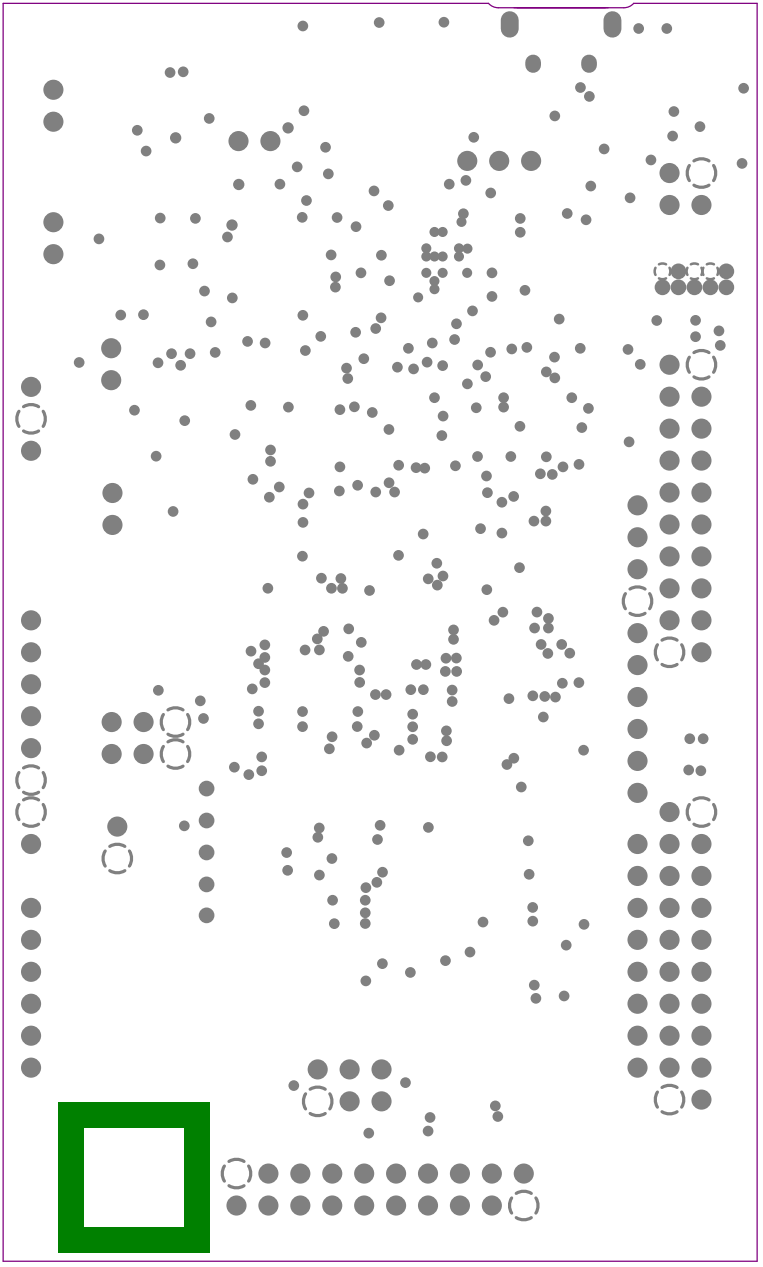
Medium MCU Mechanical Dimensions

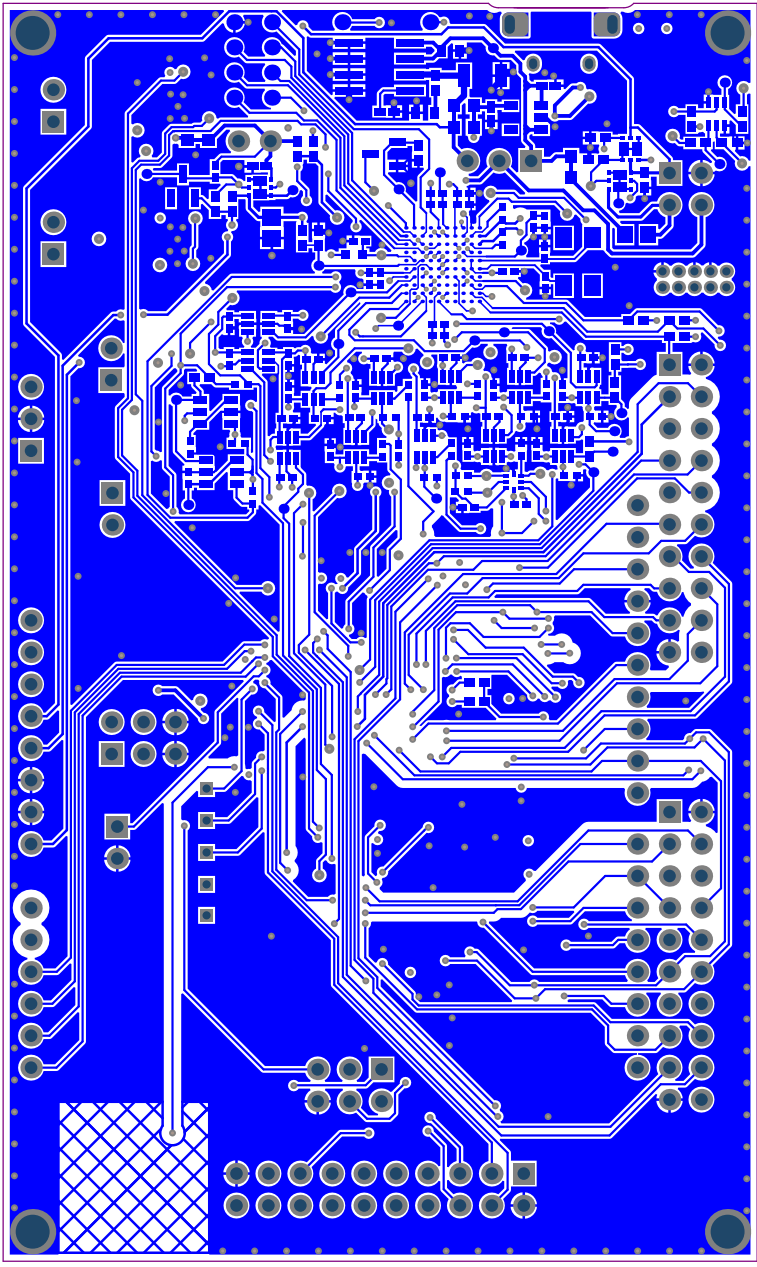












Component list

Bill of Materials Fitted For Variant [Default_assembly] of Project [SAMC21N_Xplained_Pro.PrjPCB] (No PCB Document Selected)

Source Data From: **SAMC21N_Xplained_Pro.PrjPCB**
 Project: **SAMC21N_Xplained_Pro.PrjPCB**
 Variant: **Default_assembly**



Report Date: 4/10/2017 3:14:05 PM
 Print Date: 4/10/2017 3:11:56 PM

Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100, C101	2	2.2uF	Murata	GRM188R71A225KE15D	Ceramic capacitor, SMD 0603, X7R, 10V, 10%
Fitted	C102, C304, C305, C306, C307, C308, C310, C311, C312, C502, C503, C506, C509, C510, C700, C701, C703, C704	18	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C103	1	22uF10V	tdk	C2012X5R1A226M0.85	Ceramic capacitor, SMD 0805, X5R, 10V, A220%
Fitted	C104, C105	2	1uF	Murata	GRM155R61A105KE15D	Ceramic capacitor, SMD 0402, X5R, 10V, 10%
Fitted	C106	1	470pF	Murata	GRM1555C1H471JA01D	Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C108, C309	2	10uF16V	Taiyo Yuden	EMK107BJ106MA-T	Ceramic capacitor, SMD 0603, X5R, 16V, 10UF +/- 20% (High Density)
Fitted	C109, C406, C407, C408	4	1 nF COG	Murata	GRM1555C1H102JA01D	Ceramic capacitor, SMD 0402, COG, 50V, +/-5%
Fitted	C300	1	1u	Kemet	C0402C105K9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-10% (de26942)
Fitted	C301	1	4.7n			Ceramic capacitor, SMD 0402, X7R, 25V, +/-10% (de35287)
Fitted	C302, C303, C501, C508	4	15p	AVX	04025A150JAT2A	Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C400, C401	2	22p			Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C402	1	10p			Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C404, C410, C411, C412, C413	5	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C405, C409, C414, C415	4	2.2uF	Kemet	C0402C225MBPAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-20%
Fitted	C500, C507	2	4.7uF	Murata	GRM21BR61E475KA12L	Ceramic capacitor, SMD 0805, X5R, 25V, +/-10%
Fitted	C504	1	10uF50V	tdk	CGA6F3X7S1H106K	Ceramic capacitor, SMD 1210, X7S, 50V, A210%
Fitted	C505	1	220p			Ceramic capacitor, SMD 0402, X7R, 50V, +/-10%
Fitted	C600, C601, C602, C603, C604, C605, C606, C607, C608, C609, C610, C611, C612, C613, C614, C615, C616, C617, C618, C619, C620, C621, C622, C623, C624, C625	26	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	D100	1	BAT54	Philips	BAT54	Schottky diode, V(rm)=30V, I(f)=0.1A, V(f)=0.4V (at If = 0.01A), I(r)=0.5uA (at Vrrm), t(rr)=5ns, SMD SOT23
Fitted	D400	1	SML-P11MT	ROHM	SML-P11MT-T86	LED, SMD 0402, Green, Wave length=569nm, 2.1mcd @ (1mA, 1.9Vf)
Fitted	D401, D700	2	SML-P11YT	ROHM	SML-P11YT-T86	LED, SMD 0402, Yellow, Wave length=586nm, 7.6mcd @ (1mA, 1.9Vf)
Fitted	D402	1	EM1212MTAG	ON Semiconductor	EM1212MTAG	EM1212, SZEM1212 Single Pair Common Mode Filter with ESD Protection
Fitted	D600	1	BAV99	Philips	BAV99	High-speed Double Diode
Fitted	E1, E2, E3, E4	4	SJ-5076	3M	SJ-5076	2.8mm adhesive feet, diam 8.0mm
Fitted	F100	1	MC36213	Multicomp	MC36213	Resettable PTC fuse, I_h = 0.5A, I_t = 1.0A, 0805 package
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 firmw are	ATMEL	EDBG secured firmw are	EDBG secured firmw are
Fitted	J100	1	P101-2*10RGF-139-ND		P101-2*10RGF-139-ND	Pin header, 2x2, Right Angle, 2.54mm, TH, Pin In Paste
Fitted	J101	1	Pin header 1x2 right angle	Pro-data International Corp	2213R-2G	1x2 pin header, right angle, 2.54 mm pitch, through-hole
Fitted	J102, J503	2	HMTSW-103-23-F-S-237	SAMTEC	HMTSW-103-23-F-S-237	1x3 pin header, 2.54mm pitch, Pin-in-Paste THM, 1mm hole
Fitted	J200, J201, J202	3	P101-2*10RGF-139-ND		P101-2*10RGF-139-ND	Pin header, 2x10, Right Angle, 2.54mm, THM, Pin In Paste
Fitted	J203	1	PN HEADER 2x5	Garry	STL21-0730 G TT-10U	2x5 pin header, 1.27mm pitch, THM
Fitted	J400	1	ZX62D-AB-5P8			Micro USB AB Connector, Standard SMT + DIP
Fitted	J500, J501, J502, J505, J700	5	HMTSW-102-23-F-S-237	SAMTEC	HMTSW-102-23-F-S-237	1x2 pin header, 2.54mm pitch, Pin-in-Paste THM
Fitted	J701	1	HMTSW-103-23-F-D-237	SAMTEC	HMTSW-103-23-F-D-237	2x3 pin header, 2.54mm pitch, Pin-in-Paste THM
Fitted	JS100, JS101, JS500, JS501	4	SNT-100-BK-G	SAMTEC	SNT-100-BK-G	Jumper cap for 2.54mm pinheader
Fitted	L300, L401, L402, L700	4	BLM18PG471SN1	Murata	BLM18PG471SN1	SMD RF inductor 0603, Z=470Ohm (@100MHz), Max I(rdc)=0.650Ohm, Max current=1A
Fitted	LABEL1	1	Label PCB A	ACT Logimark AS	505462	PCBA identification label PP Top White Gloss
Fitted	PCB1	1	SAM C21N Xplained Pro PCB			SAM C21N Xplained Pro PCB, 4 layer, 60mm x 100mm
Fitted	PCBADOC1	1	A09-2682 PCB A Files			SAM C21N Xplained Pro PCB A documentation
Fitted	Q100, Q101, Q103	3	DMP2160UFDB	Diodes Incorporated	DMP2160UFDB	MOSFET 20V 3.8A DUAL P-CHAN, Rds 70 mOhms, Vgs 12V, Vds -20
Fitted	Q102	1	2N7002.215	NXP	2N7002.215	N-Channel MOSFET, 60V, 0.300A continuous, 1.2A Peak, RDS(ON) = 3.80hm @ VGS=4.5V, VGS(th) < 2.5V
Fitted	Q400	1	2N7002DW	Fairchild	2N7002DW	Dual N-Channel MOSFET, 60V, 115mA cont.RDS(ON) < 7.5 Ohm @ 50mA @ 5V, SOT-363
Fitted	Q600, Q601	2	FDC6327C	Fairchild	FDC6327C	Dual NP-ch MOSFET, 20V, 2.7A/1.9A cont, 8A/8A pulse, RDS(ON) < 0.080, 170hm @ VGS=4.5V, VGS(th) < 1.5V, SSOT8
Fitted	R100, R106, R107, R506	4	100k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R101	1	2R			RES SMD 2 OHM 1% 1/16W 0402
Fitted	R103, R410, R413	3	1M			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R104, R301, R401, R402, R409, R411, R412, R503, R702	9	1k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R105, R502, R701	3	10k	vishay	CRCW040210K0FKED	Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R109, R110, R111, R112	4	47k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R300, R600, R603, R604, R605, R606, R608, R613, R615, R616, R617, R622, R623, R624	14	100k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R304, R421, R422, R609	4	39R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R305, R306, R315, R316, R504	5	4.7k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R313, R314, R610, R611, R612, R800	6	0R			Thick film resistor, SMD 0402, 1/16W, 1%, Thick film resistor, SMD 0402, 1/16W, 1%, Thick film resistor, SMD 0402, 1/16W, 1%, RES 0.0 OHM 1/16W 0402 SMD
Fitted	R423	1	6.81k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R500, R501, R507, R508	4	62R			Thick film resistor, SMD 1210, 0.5W, 1%
Fitted	R505	1	2.7k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R601, R602	2	4.7k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R607, R614, R618, R619, R620, R621, R700	6	330R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R700	1	39R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	SW301, SW500, SW700	3	SKRAAKE010	ALPS	SKRAAKE010	6.2x6.2 mm SMD tact sw 1tch, same as A08-0091 but less force is needed
Fitted	TEST1	1	SAM C21N Xplained Pro test			Fixture egg test for SAM C21N Xplained Pro
Fitted	TESTDOC1	1	SAM C21N Xplained Pro Test Instructions			SAM C21N Xplained Pro Test Instructions
Fitted	U100	1	MC5504-3.3YM6	Microchip	MC5504-3.3YM6-TR	LDO 3.3V 0.3A SOT-23-5
Fitted	U103	1	MC5209-3.3YM	Microchip	MC5209-3.3YM	Fixed 3.3V, 500mA Low-Noise LDO Regulator, SOIC-8
Fitted	U300	1	ATSAMC21N18A-ANT	ATMEL	ATSAMC21N18A-ANT	Atmel 32-bit ARM Cortex-M0+ processor 100pin 256KB Flash 32KB SRAM 48MHz freq
Fitted	U400	1	A132UC3A4256J-C1UR	ATMEL	A132UC3A4256J-C1UR	AVR 32-bit RISC MCU
Fitted	U500, U502	2	ATA6561-GBQW	ATMEL	ATA6561-GBQW	5Mbit/s CAN Transceiver, VCC = 5V, VIO = 2.8-5V, 3x3 mm VDFN8
Fitted	U501	1	ATA663211-FAQW	ATMEL	ATA663211-FAQW	LIN Transceiver
Fitted	U600	1	FXMA2102L8X	Fairchild	FXMA2102L8X	Dual supply, 2-bit, voltage translator, buffer, repeater, isolator for I2C applications
Fitted	U601, U602, U603, U604, U605, U606, U607, U608, U609, U610, U611, U612	12	SN74LVC1T45DCKR	Texas Instruments	SN74LVC1T45DCKR	Single-Bit Dual-Supply Bus Transceiver with Configurable Voltage Translation and 3-State Outputs
Fitted	U700	1	A1ECC508A-MAHWF-T	ATMEL	A1ECC508A-MAHWF-T	Secure authentication and product validation device, EEPROM, I2C, 2.0 - 5.5V, UDFN8
Fitted	XC300	1	32.768kHz	Kyocera Crystal Device Corporation	ST3215SB32768E0HFVBB	Kyocera ST3215SB32768E0HFVBB, 32.768kHz, 9pF, SMD tuning fork crystal
Fitted	XC400	1	12.0MHz	Fox Electronics	FO5032B-12-C-C-C-200-1	Fox FO5032B 12.0MHz SMD crystal 738B-12
Not Fitted	C107	0	2.2uF	Kemet	T494A225K010AT	Capacitor Tantalum 10V 2.2uF 10% ESR = 6 ohm
Not Fitted	C318, C319	0	10p			Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Not Fitted	C403	0	4.7n			Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Not Fitted	J800	0	HMTSW-103-23-F-D-237	SAMTEC	HMTSW-103-23-F-D-237	2x3 pin header, 2.54mm pitch, Pin-in-Paste THM
Not Fitted	J801	0	SSQ-110-21-F-S	SAMTEC	SSQ-110-21-F-S	1x10 receptacle pin header, low insertion force, 2.54mm pitch THM, Pin in Paste
Not Fitted	J802, J804	0	SSQ-108-21-F-S	SAMTEC	SSQ-108-21-F-S	1x8 receptacle pin header, low insertion force, 2.54mm pitch THM, Pin in Paste
Not Fitted	J803	0	SSQ-106-21-F-S	SAMTEC	SSQ-106-21-F-S	1x6 receptacle pin header, low insertion force, 2.54mm pitch THM
Not Fitted	R424	0	1M	KOA	RK73H1ETTP1004F	Thick film resistor, SMD 0402, 1/16W, 1%
Not Fitted	XC301	0	16.0MHz	Epson Toyocom	TSX-3225 16.000M09Z-AC3	16MHz uXtal, 3.2 x 2.5 mm SMD, CL=9pF, 15PPM, ESR=80ohm(Max)

Approved	Notes
220	