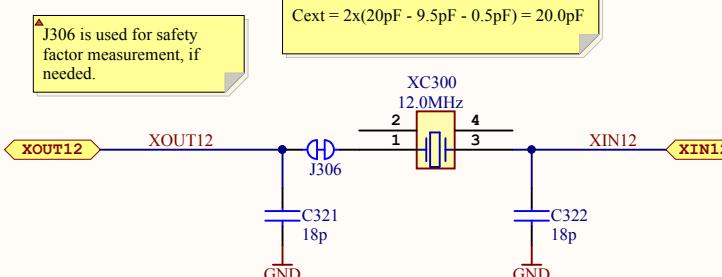
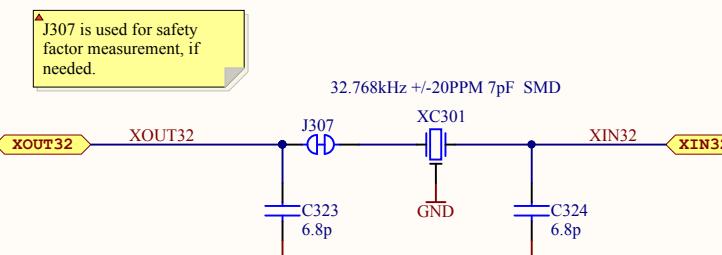


A

▲ Calculation of crystal load capacitors:
 $C_{ext} = 2x(C_{crystal} - CL - C_{pcb})$
 $C_{crystal} = 20\text{pF}$ (from crystal datasheet)
 $CL = 9.5\text{pF}$ (from MCU datasheet)
 $C_{pcb} = 0.5\text{pF}$ (estimate)
 $C_{ext} = 2x(20\text{pF} - 9.5\text{pF} - 0.5\text{pF}) = 20.0\text{pF}$



B



C

▲ Calculation of crystal load capacitors:
 $C_{ext} = 2x(C_{crystal} - C_{para} - C_{pcb})$
 $C_{crystal} = 7.0\text{pF}$ (from crystal datasheet)
 $C_{para} = 0.7\text{pF}$ (from MCU datasheet)
 $C_{pcb} = 0.5\text{pF}$ (estimate)
 $C_{ext} = 2x(7.0\text{pF} - 0.7\text{pF} - 0.5\text{pF}) = 11.6\text{pF}$

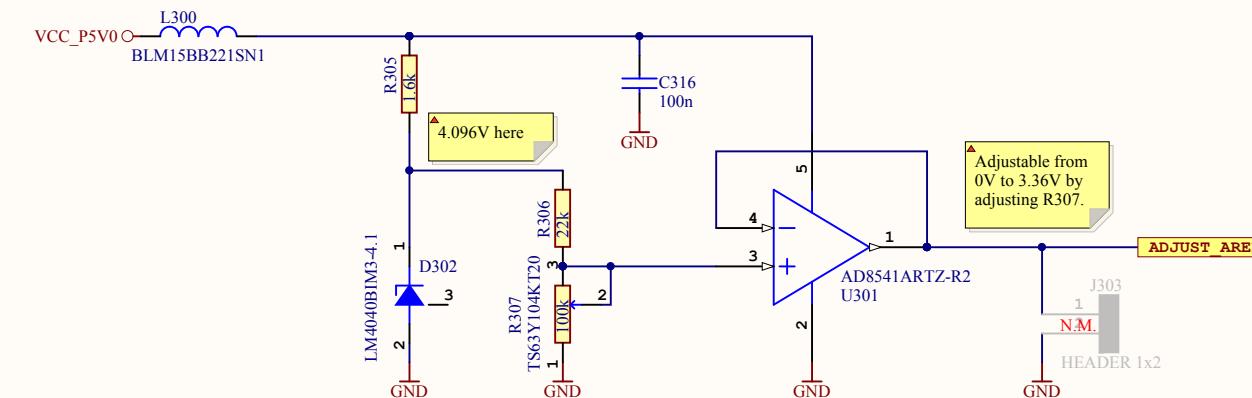
D

ATMEL Norway	*		
Vestre Rosten 79	*		
N-7075 TILLER	*		
NORWAY			
Date:	27.03.2015	11:07:35	PAGE: 5 of 8
Document number:	5	Revision	5
TITLE: Crystal Oscillators			
SAM4S_Xplained_Pro_Oscillators.SchDoc			

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Enabling Unlimited Possibilities

A

A



B

B

C

C

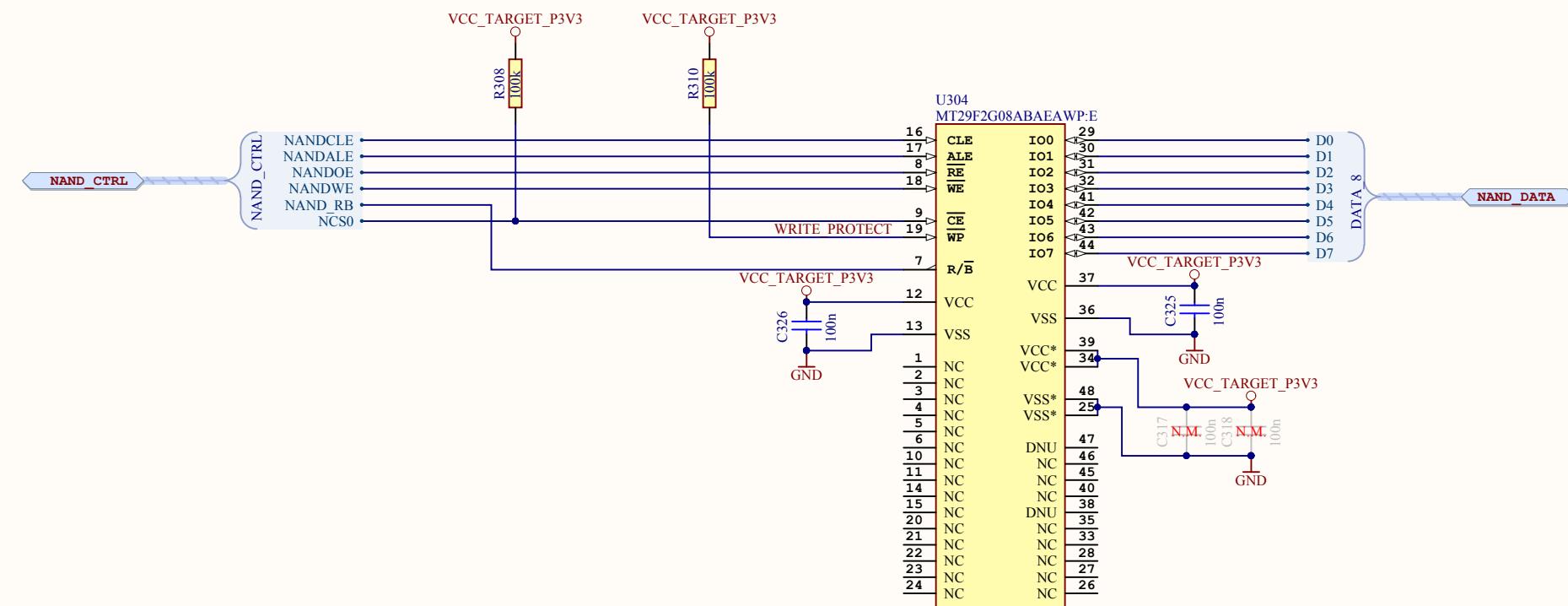
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D

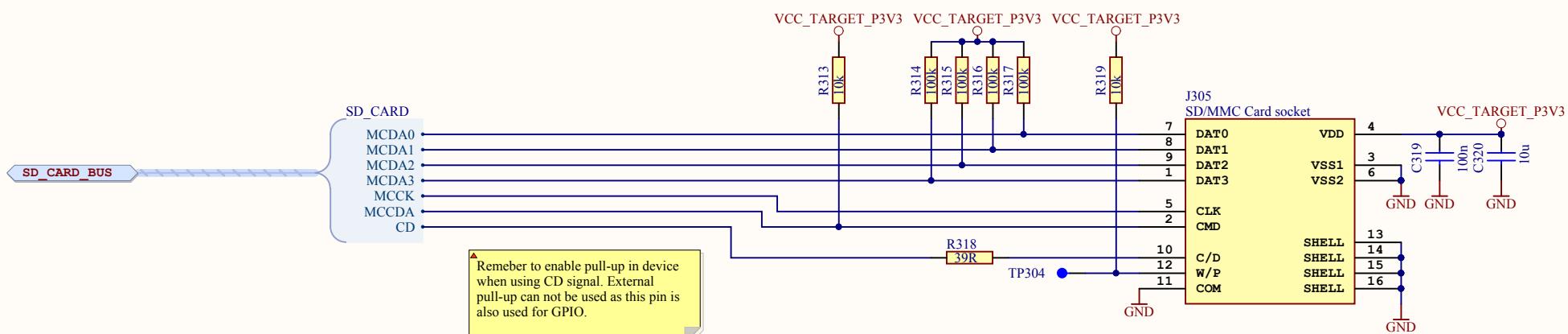
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NORWAY			
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TITLE: Adjustable Analog Reference			
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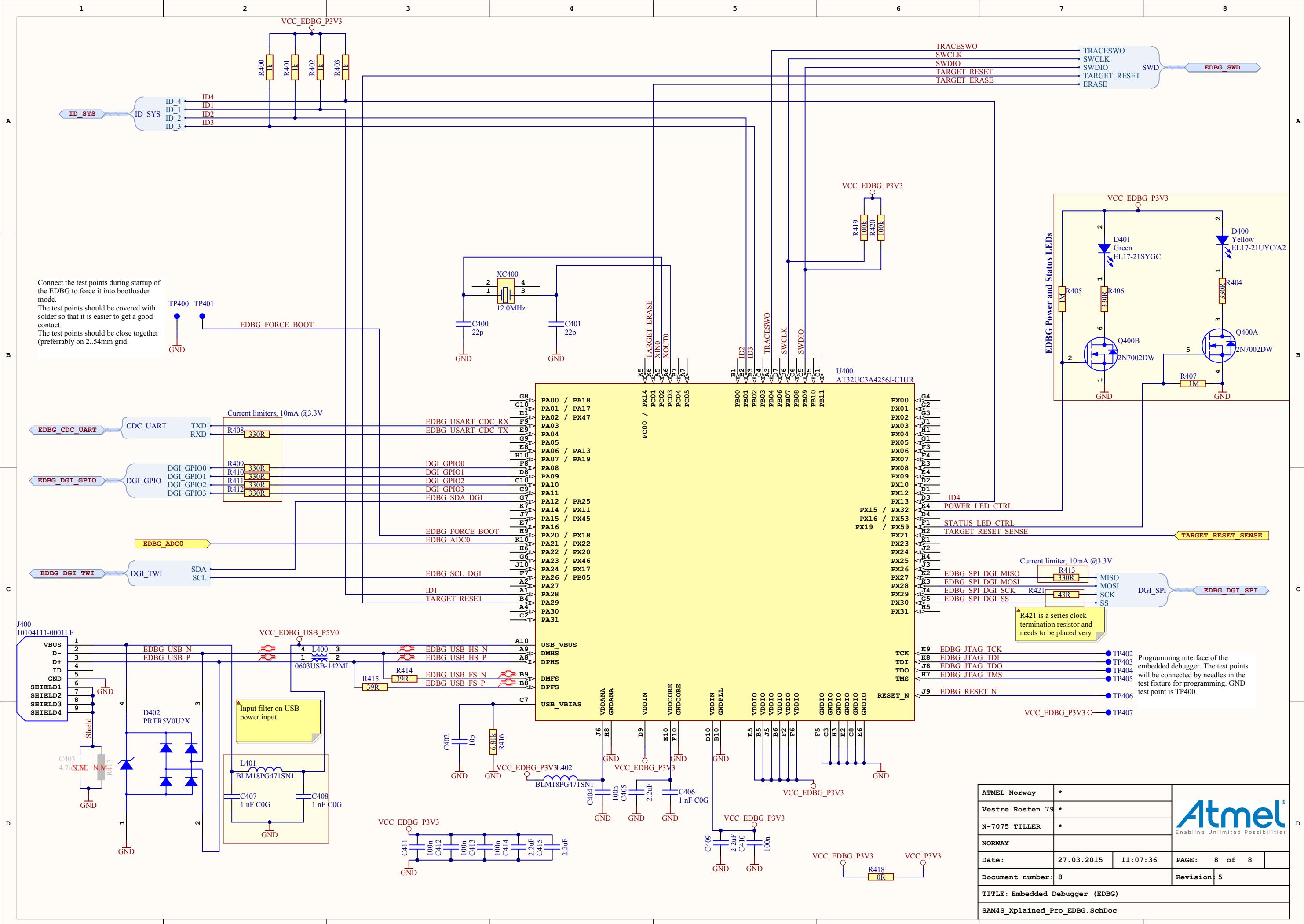
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A

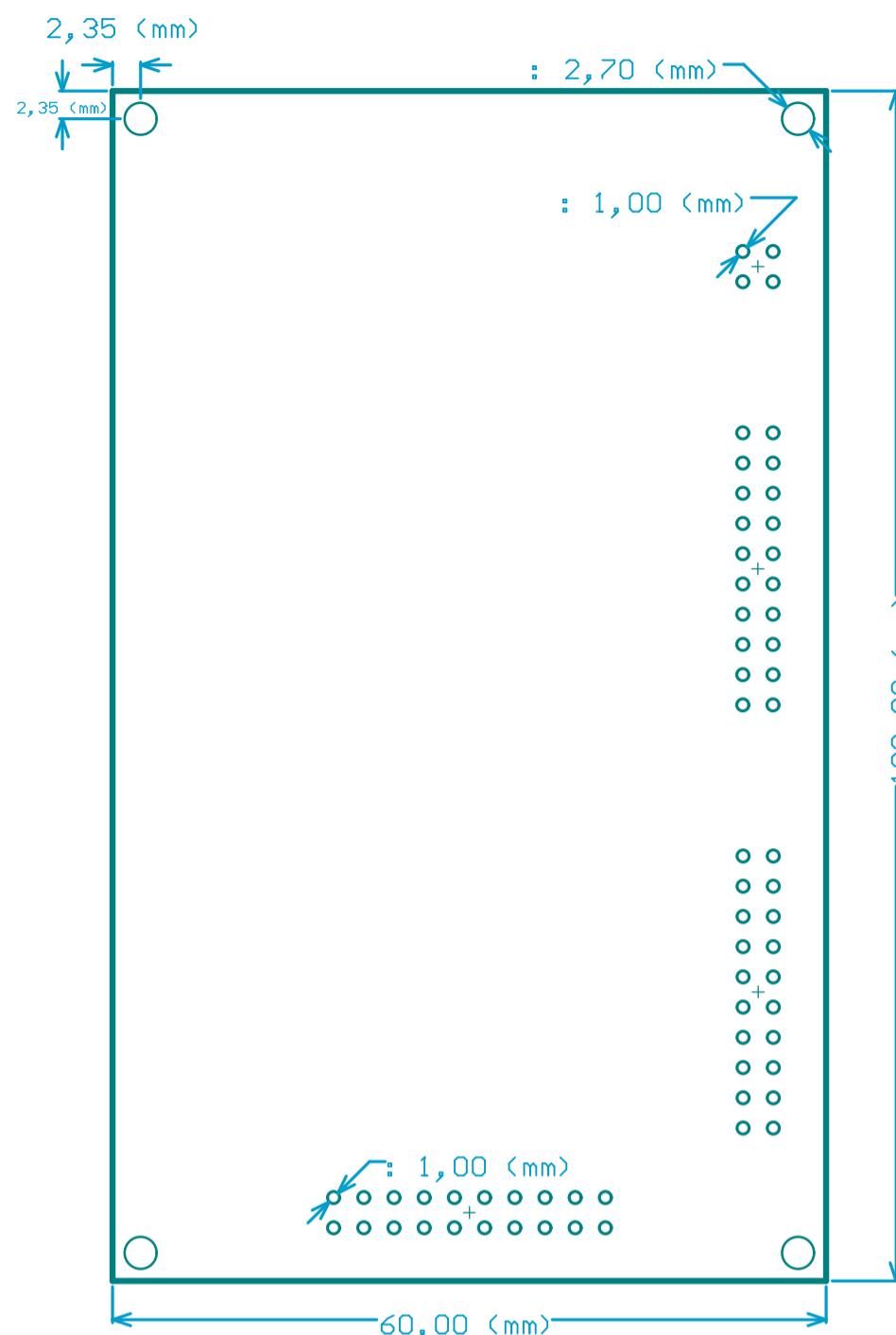


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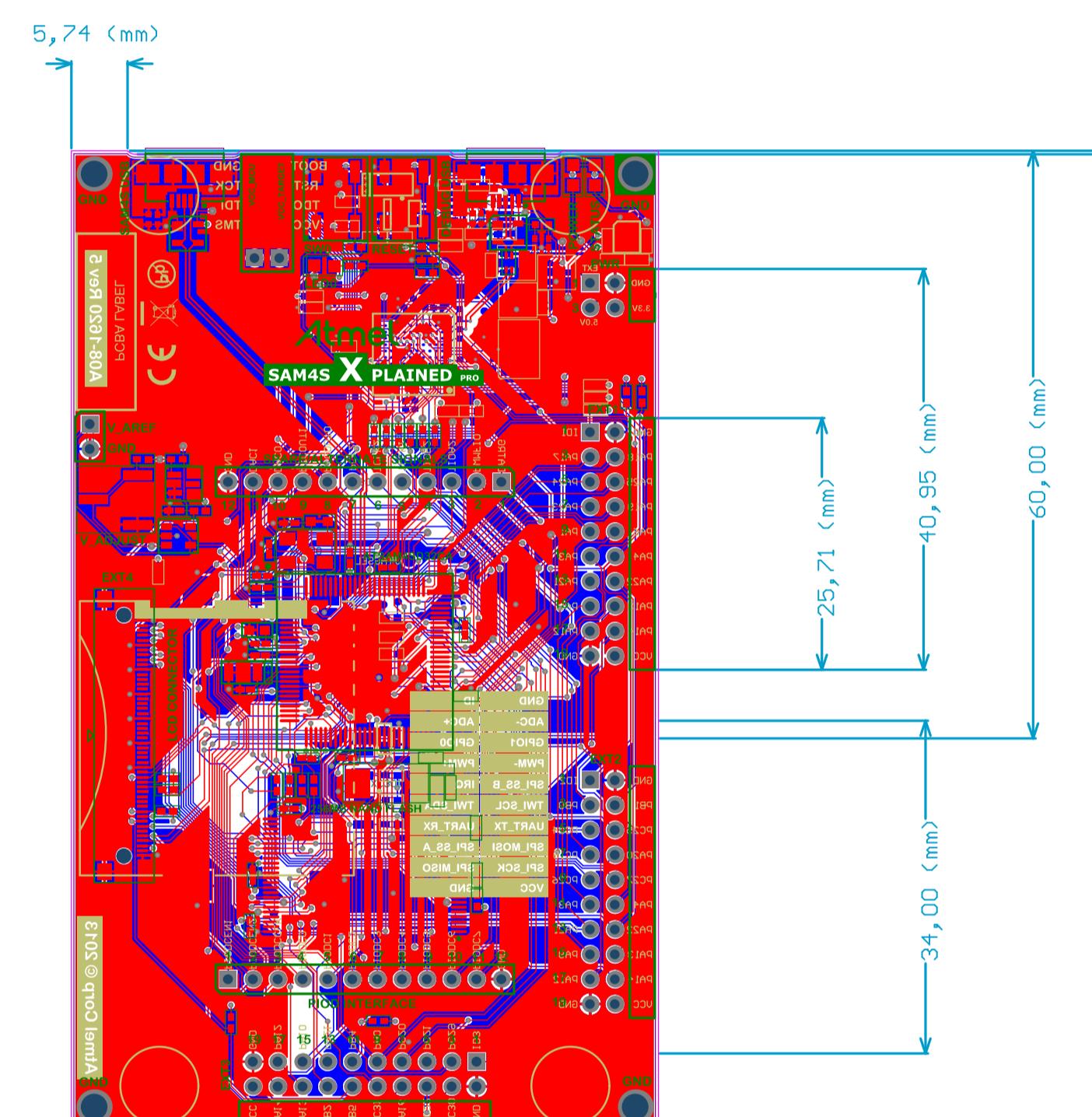
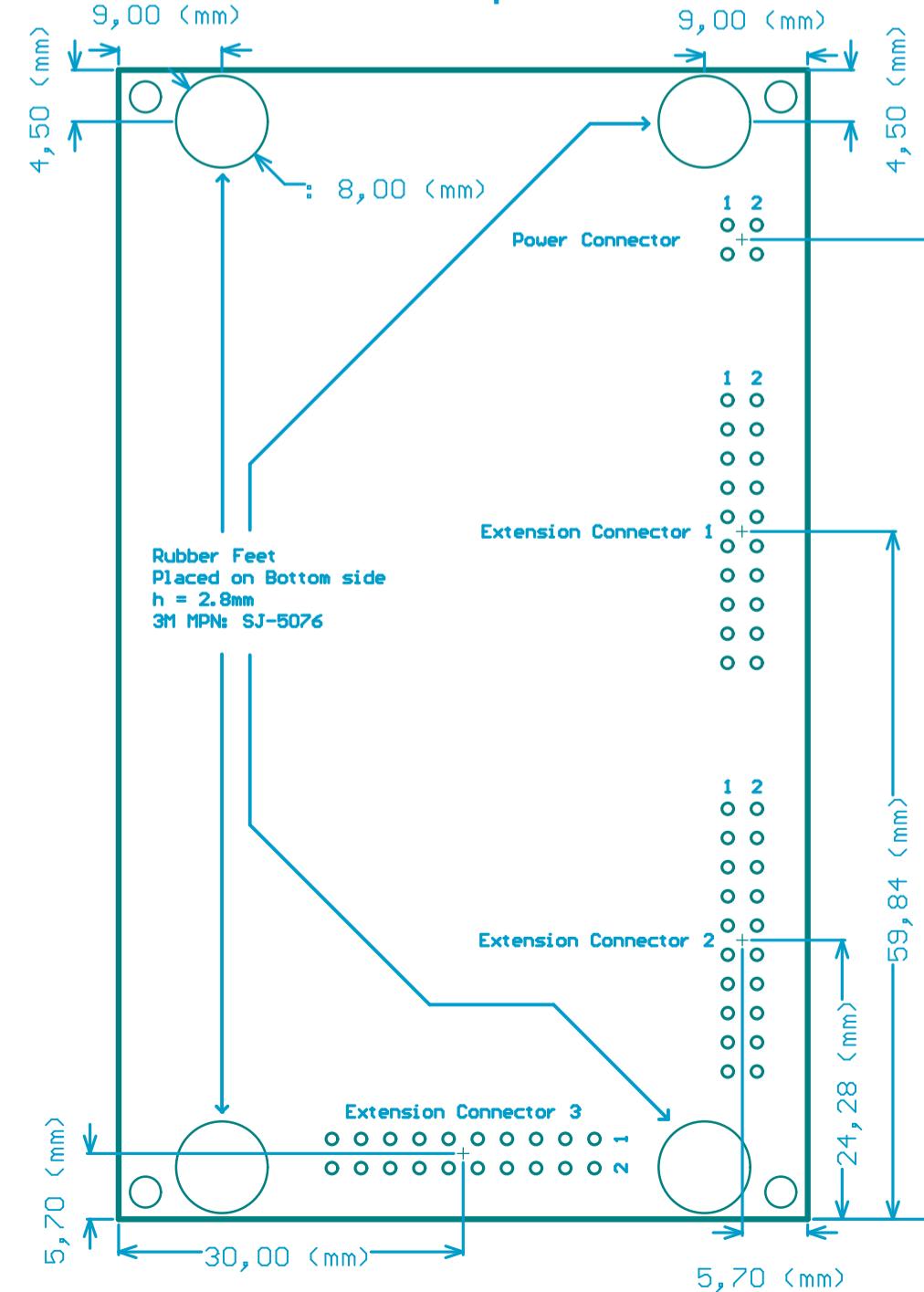




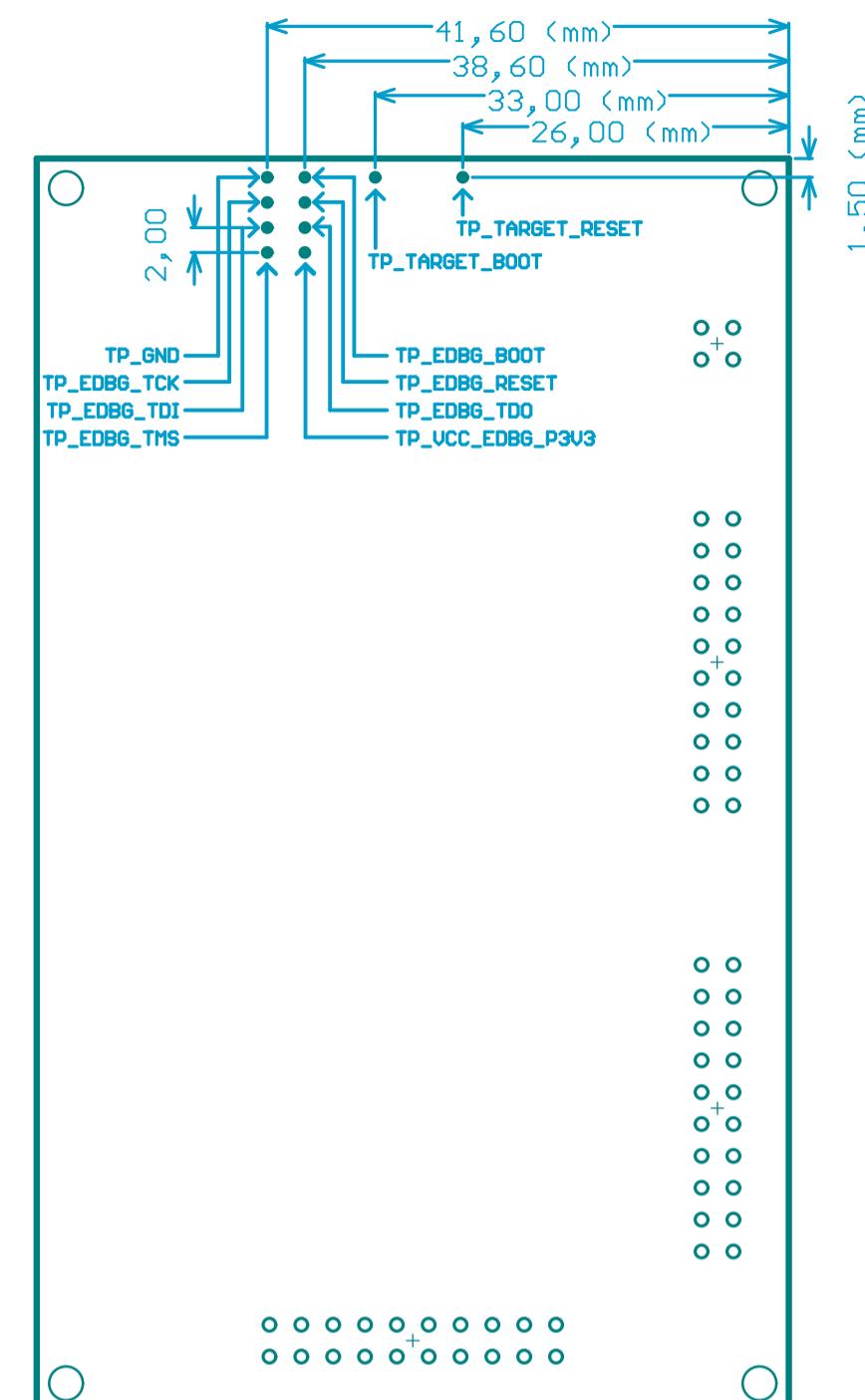
Medium MCU Mechanical Dimensions



Medium MCU Component Placement



Medium MCU Test Points

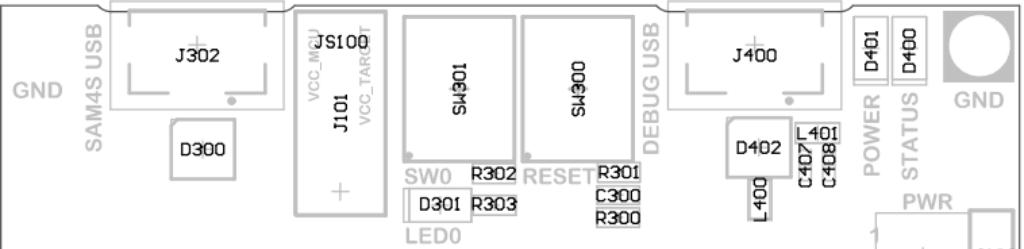


Atmel	ENGINEER:	DATE:
	PCB DESIGNER:	PART NO.:
		REV.:
		FILE NAME:
		DWG NO.:
		SCALE:

ATEL NORWAY
Vestre Rosten 79
N-7075 Trondheim, Norway

27.03.2015

SAM-X_Plained_ProPcbDoc



Atmel

SAM4S X PLAINED PRO

V_AREF

GND

R306

R305

D302

12 11 10 9 8 7 6 5 4 3 2 1 SPARE/ALTERNATE SIGNALS

R413
R409
R408
R410
R412
R411

C302 XC300
C303

V_ADJUST

U301

LCD CONNECTOR

J203

R200
R202
R201

C321 J306
C322
C301
C304
XC300
C302
C303
C306
C307
C308
C310
C309

U300

C311
C305

C313 C314 C315
XC301
C324
C323
J307
R421
R205
R204
R203
256MB NAND FLASH

C325

U304

1 2 3 4 5 6 7 8 9 10 11 12

PIO3 INTERFACE

R309

19 17 15 13 11 9 7 5 3 1
EXT3
R311
+
J202

EXT1
R320
R312

EXT2

J201

1 3 5 7 9 11 13 15 17 19

1 3 5 7 9 11 13 15 17 19

EXT1
R320
R312

J201

GND

GND

PCBA LABEL
A08-1620 Rev 5
LABEL1



TP300

TP303BOOT

TP401

TP400ND

RSTP406

TP402CK

TDO

TP404

TP408DI

VC

TP407

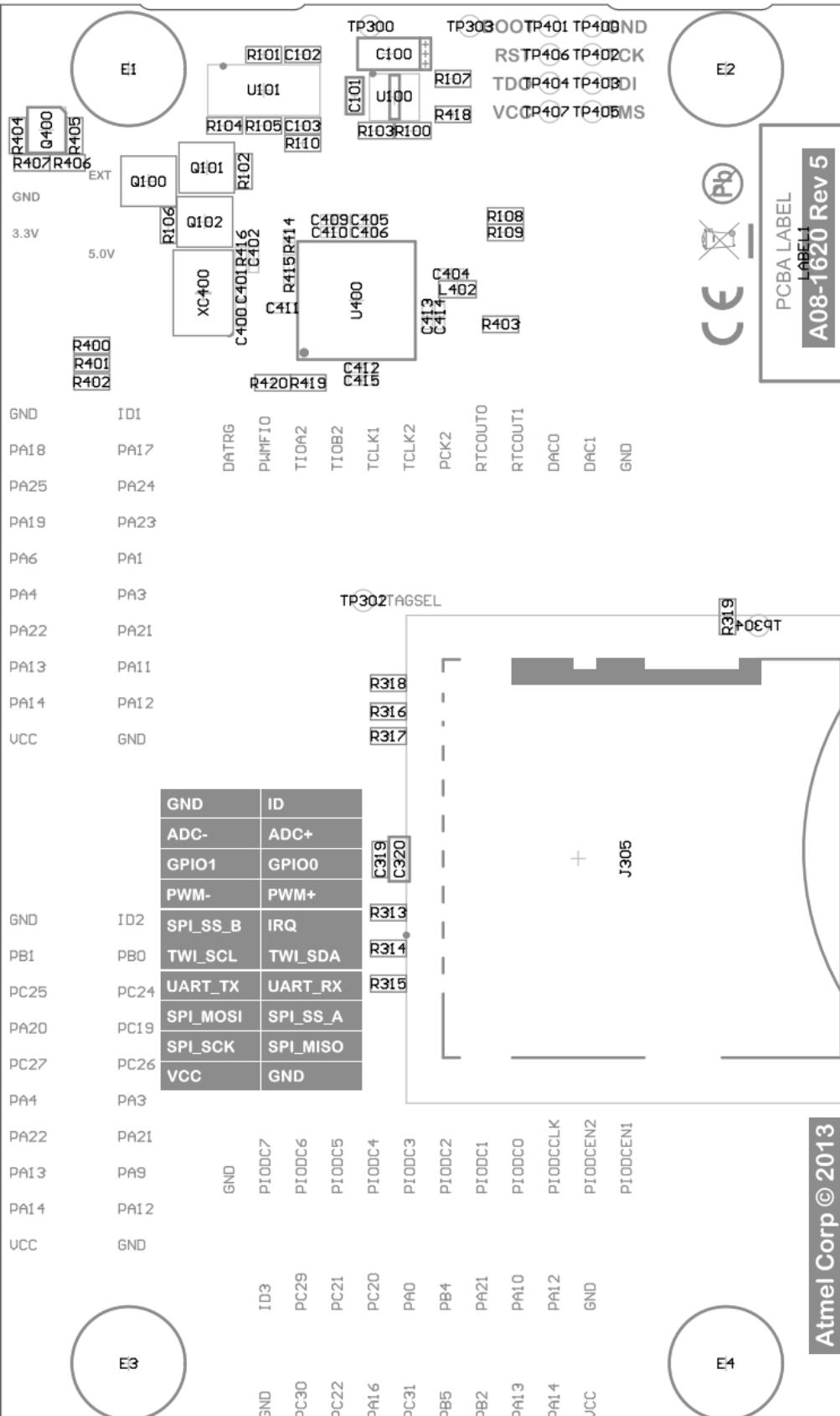
TP405MS

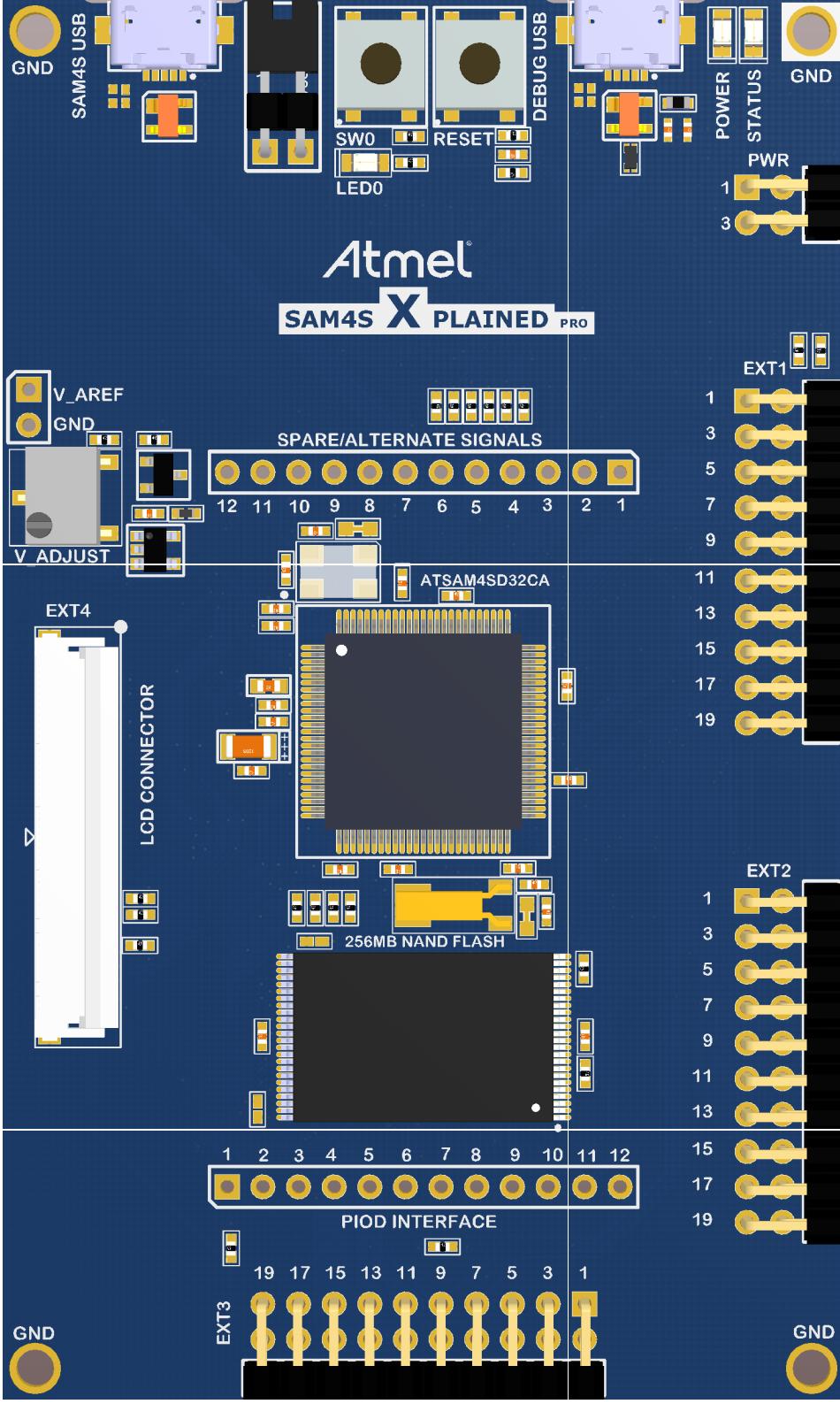
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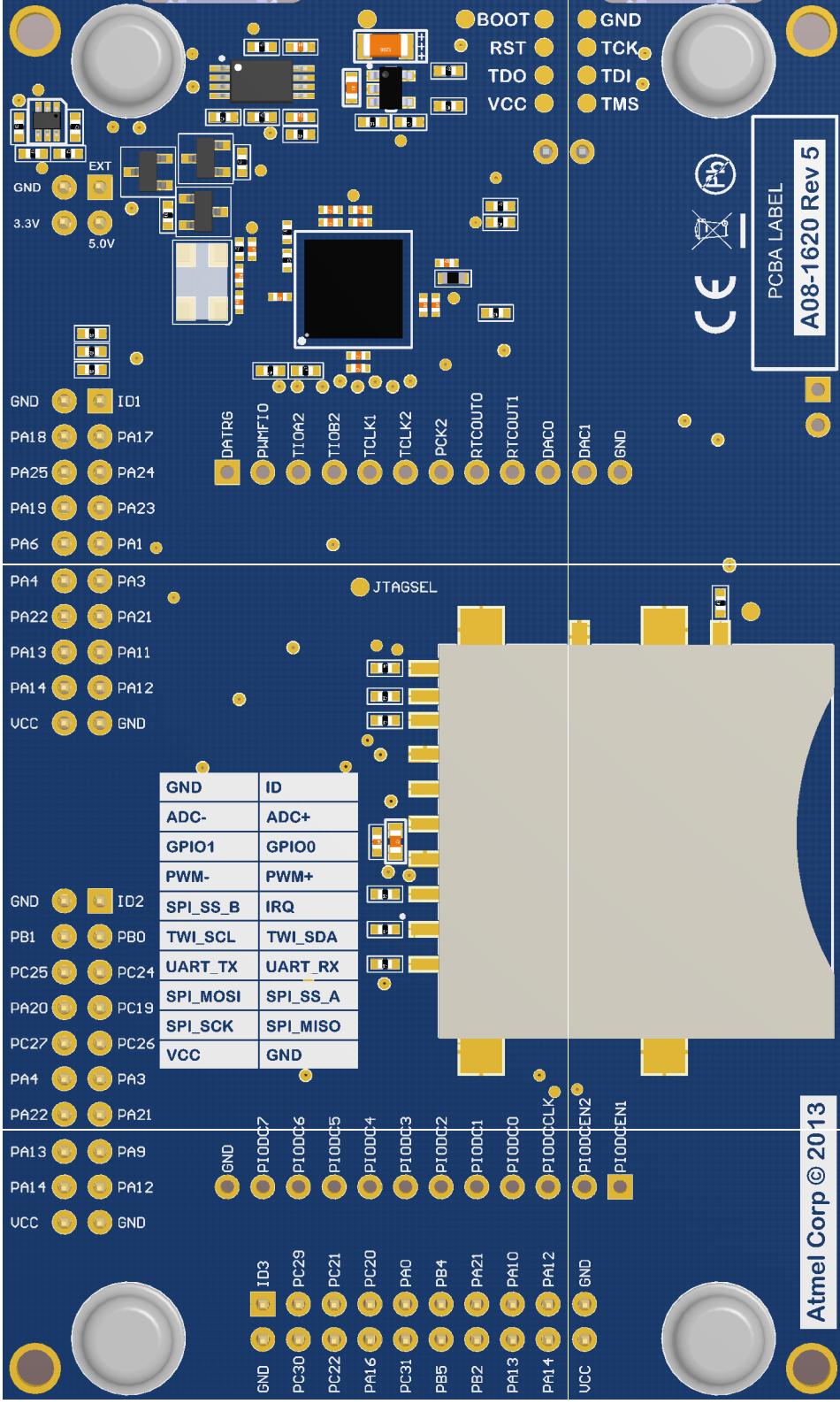
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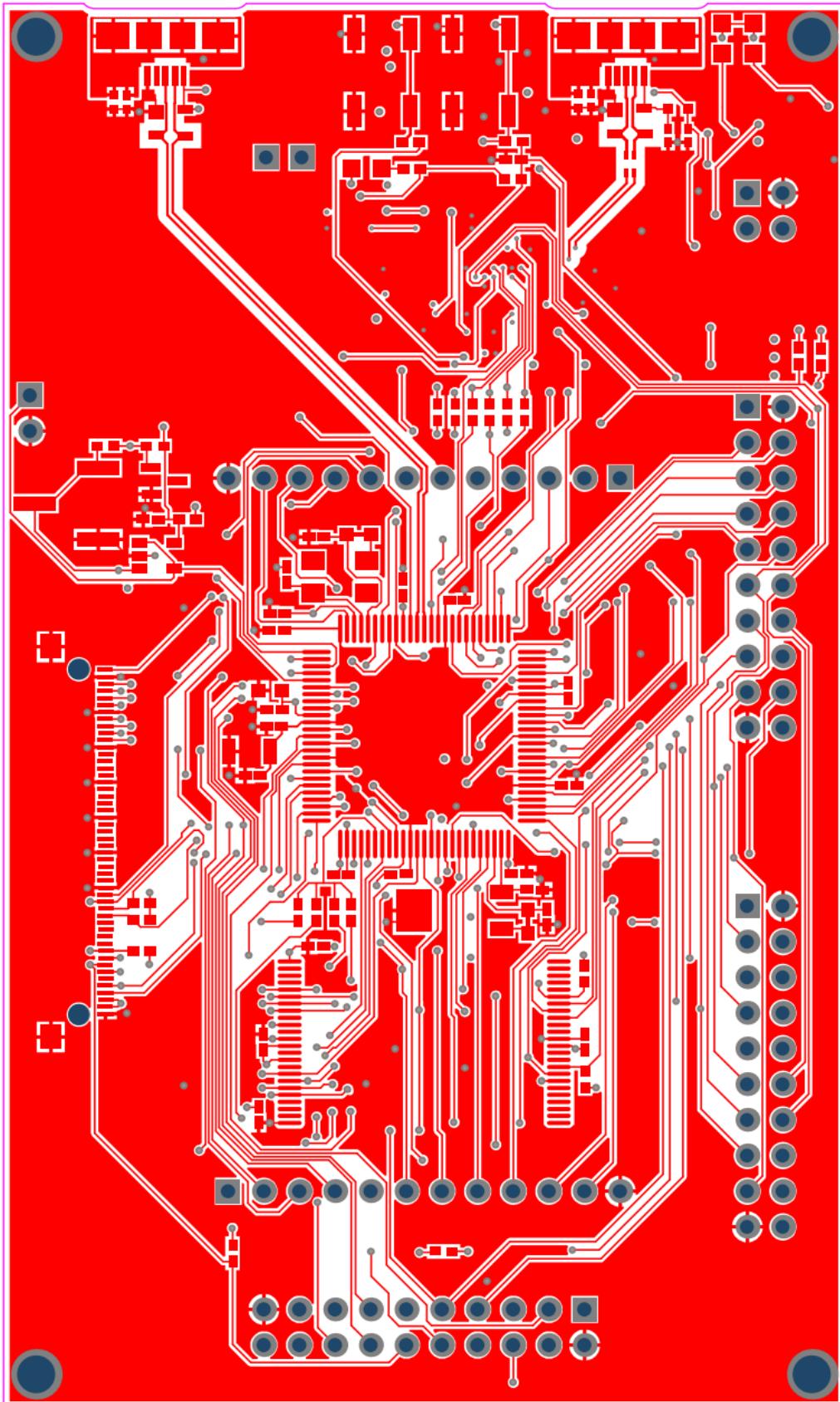
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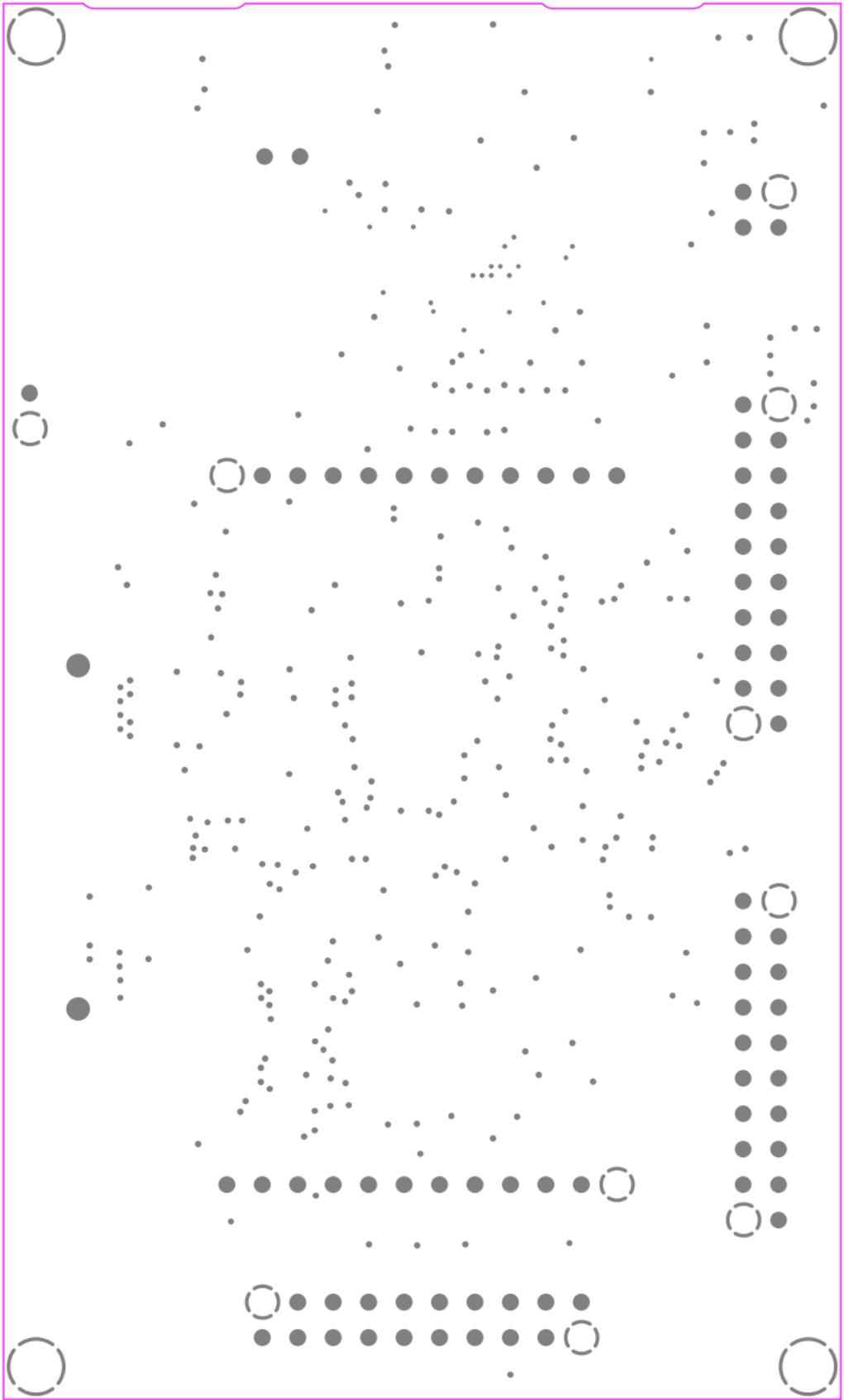
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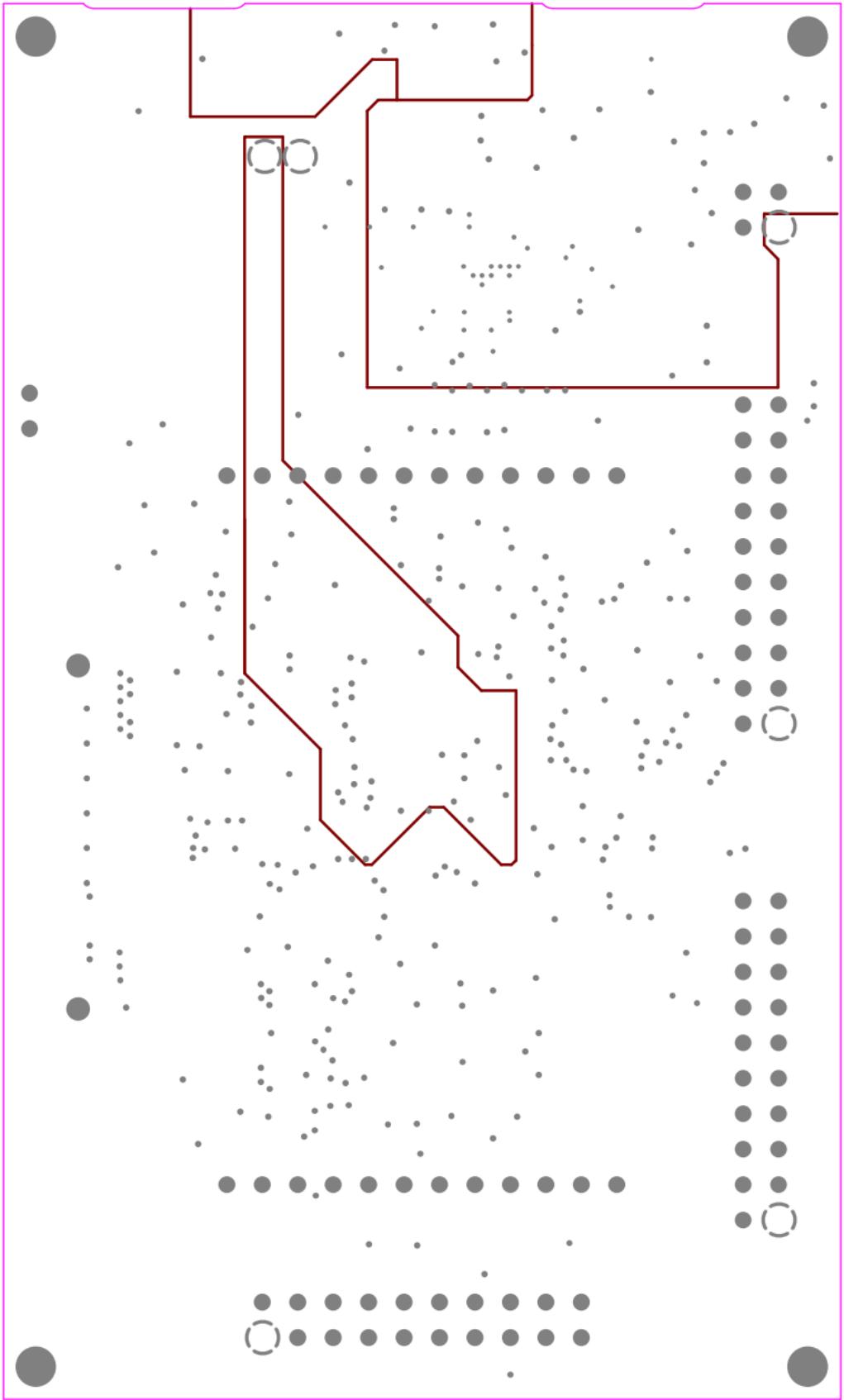


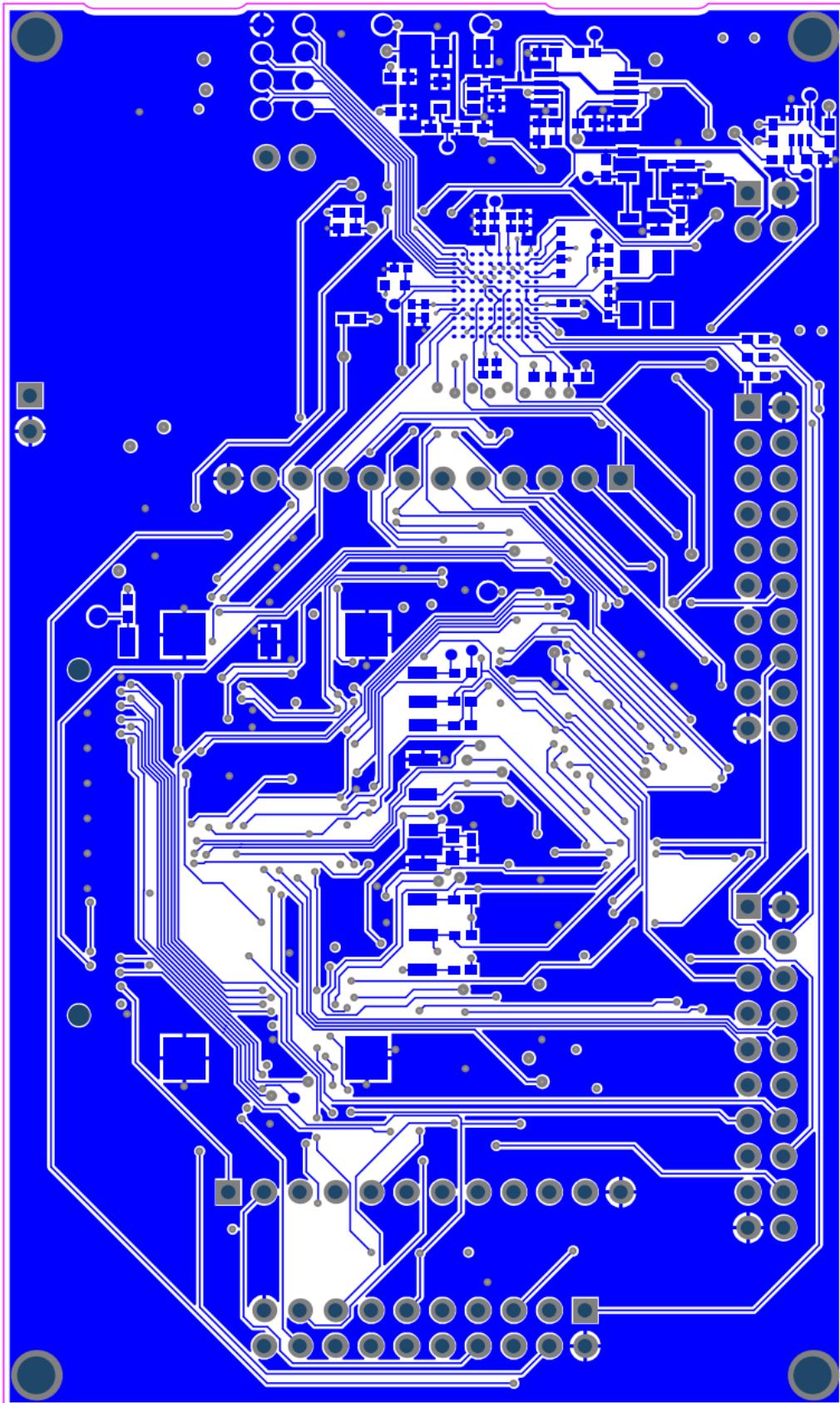












Component list

Top Level Schematics

Source Data From:

SAM4S_Xplained_Pro.PriPCB

Project:

SAM4S_Xplained_Pro.PriPCB

Variant:

Default_assembly

Report Date: 27.03.2015 11:08:12

Print Date: 27.03.2015 11:01:50



Fitted	Designator	Quantity	Value	Manufacturer	MPN	Description
Fitted	C100	1	10u	vishay	TR3A106K018C1700	SMD tantalum capacitor, ESR = 1.7, 3216-18 (EA) 1206,
Fitted	C101	1	4.7uF	tdk	C1608X5R1475K	Ceramic capacitor, SMD 0603, X5R, 10V, 10% (d31036)
Fitted	C102, C103, C301, C302, C303, C304, C305, C307, C308, C309, C311, C313, C314, C315, C316, C319, C325, C326, C404, C410, C411, C412, C413	23	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Fitted	C300	1	4.7n			Ceramic capacitor, SMD 0402, X7R, 25V, +/-10% (de35287)
Fitted	C306, C320	2	10u	Kemet	T494A225K010AT	Ceramic capacitor, SMD 0603
Fitted	C310	1	2.2uF	Kemet	T494A225K010AT	Capacitor Tantalum 10V 2.2uF 10% ESR = 6 ohm
Fitted	C321, C322	2	18p			Ceramic capacitor, SMD 0402, NPO, 50V, +/-5%
Fitted	C323, C324	2	6.8p			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	C405, C409, C414, C415	4	2.2uF	Kemet	C0402C225M9PAC	Ceramic capacitor, SMD 0402, X5R, 6.3V, +/-20%
Fitted	C406, C407, C408	3	1nF COG	Murata	GRM155C1H102JA01D	Ceramic capacitor, SMD 0402, COG, 50V, +/-5%
Fitted	D300, D402	2	PRTR5V0U2X	Philips	PRTR5V0U2X	Double rail-to-rail USB ESD protection diode
Fitted	D301, D400	2	EL17-21UY/C1A2	Everlight	17-21UY/C1S530-A3/TB	LED, Yellow, Wave length=511nm, SMD 0805, +/-70%
Fitted	D302	1	LM4040BM3-4.1	National Instruments	LM4040BM3-4.1	Voltage reference 4.096V, SOT-23
Fitted	D401	1	EL17-21SYGC	Everlight	EL17-21SYGC	LED, Green, Wave length=575nm, SMD 0805, +/-70%
Fitted	DOC1	1	A09-1803 PCB Files	ATMEL		SAMS Xplained PRO PCB documentation
Fitted	E1, E2, E3, E4	4	SJ-5076	3M	SJ-5076	2.8mm adhesive feet, diam 8.0mm
Fitted	FKTURE1	1	Xplained PRO MCU board Jupiter Test Fixture	ESCAPEC	Xplained PRO MCU board Jupiter Test Fixture	Xplained PRO MCU board Jupiter Test Fixture
Fitted	FW1	1	EDBG secured firmware			EDBG secured firmware
Fitted	J100	1	P101-2102RGF-139-ND		P101-2102RGF-139-ND	
Fitted	J101	1	Pin header, 1x2 right angle	Pro-data International Corp	2213R-2G	Pin header, 2x2, Right Angle, 2.54mm, THT, Pin In Paste
Fitted	J200, J201, J202	3	P101-2110RGF-139-ND	Pro-data International Corp	P101-2110RGF-139-ND	1x2 pin header, right angle, 2.54 mm pitch, through-hole
Fitted	J203	1	XFM-5015-1A	Omrion Components	XFM-5015-1A	Pin header, 2x10, Right Angle, 2.54mm, THM, Pin In Paste
Fitted	J302, J400	2	10104111-0001LF		10104111-0001LF	50pin FFC connector, 0.5mm pitch, Top/Bottom contacts
Fitted	J305	1	KYOCERA - 14 5738 009 #220 859+	Kyocera-elco	KYOCERA - 14 5738 009 220 859+	Micro USB AB Connector
Fitted	JS100	1	SNT-100-BK-G	SAMTEC	SNT-100-BK-G	SDMMC socket, 2.7mm, push-push, SMD
Fitted	L300	1	BLM15B6221SN1	Murata	BLM15B6221SN1	Jumper cap for 2.54mm pinheader
Fitted	L400	1	0603USB-142ML	Colcraft	0603USB-142ML	SMD RF inductor 0402, Z=220Ohm (@100MHz), Max R(d)=80.0Ohm, Max current=200mA
Fitted	L401, L402	2	BLM18P6471SN1	Murata	BLM18P6471SN1	0603USB common-mode filter in 0603
Fitted	LABE1	1	Label PCBA	ACT Logimark AS	505462	SMD RF inductor 0402, Z=470Ohm (@100MHz), Max R(d)=65.0Ohm, Max current=1A
Fitted	PCB1	1	NCAB			PCBA identification label Top White Gloss
Fitted	Q100, Q101	2	IRML6402PBF	International Rectifier	IRML6402PBF	SAMS Xplained PRO PCB, 4 layer, size 60mmx 100mm
Fitted	Q102	1	2N7002.215	NXP	2N7002.215	P-ch MOSFET, -30V, -3.7A continuous, RDS(ON)=0.05Ohm@VGS=-4.5V, RDS(ON)=0.08Ohm@VGS=-2.5V
Fitted	Q400	1	2N7002DW	Fairchild	2N7002DW	N-Channel MOSFET, 60V, 0.300A continuous, 12A Peak, RDS(ON) = 3.8Ohm@VGS=4.5V, VGS(th)=2.5V
Fitted	R100	1	30k			Dual N-Channel MOSFET, 60V, 115mA cont,RDS(ON) < 7.5 Ohm @50mA@5V, SOT-363
Fitted	R101, R102, R104, R110, R405, R407	6	1M			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R103	1	18k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R105	1	390R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R106, R200, R201, R202, R300, R308, R310, R314, R315, R316, R317, R419, R420	13	100k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R107, R418	2	0R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R108, R109	2	47k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R203, R204, R205, R421	4	43R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R303, R404, R406, R408, R409, R410, R411, R412, R413	5	39R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R303, R404, R406, R408, R409, R410, R411, R412, R413	9	330R			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R305	1	1.6k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R306	1	22k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R307	1	TS63Y104KT20	vishay	TS63Y104KT20	100k trimmer, SMD, 13 turns
Fitted	R309, R311, R312, R320	4	4.7k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R313, R319	2	10k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R400, R401, R402, R403	4	1k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	R416	1	6.81k			Thick film resistor, SMD 0402, 1/16W, 1%
Fitted	SW300, SW301	2	SKRAAKE010	ALPS	SKRAAKE010	6.2x6.2mm SMD tact switch, same as A08-0091 but less force is needed
Fitted	TEST1	1	SAM4S Xplained PRO test	ATMEL		Fixture test for SAM4S Xplained PRO
Fitted	U100	1	SPX819MS-LTR	Exar	SPX819MS-LTR	500mA LDO, low noise, SOT23-5 package
Fitted	U101	1	TPS2113PWR	Texas Instruments	TPS2113PWR	Autowitching 2.1 Power or Mux
Fitted	U300	1	ATSAM4S032CA-AU	ATMEL	ATSAM4S032CA-AU	ARM Cortex-M4 MCU with 2MB flash, 160KB SRAM
Fitted	U301	1	AD8541ARTZ-R2	Analog Devices	AD8541ARTZ-R2	Single, Low Voltage, Rail-to-rail output, Op-Amp, SOT23-5
Fitted	U304	1	MT29F2G08ABA8AWPE	Micron	MT29F2G08ABA8AWPE	2Gb, x 8 NAND flash, 3.3V 48-TSOP1
Fitted	U400	1	A132UC3A4256J-C1UR	ATMEL	A132UC3A4256J-C1UR	AVR 32-bit RISC MCU
Fitted	XC300, XC400	2	12.0MHz	Fox Electronics	FO3032B-12.C-C-C-200-1	Fox FG6032B 12.0MHz SMD crystal 738B-12
Fitted	XC301	1	32.768kHz +/-20ppm 7pF	Micro Crystal	MSIV-T1K 32.768kHz 7pF +/-20ppm TA	32.768 kHz crystal, +/-20ppm, CL=7pF, max ESR 60kOhm, SMD
Not Fitted	C312, C403	0	4.7n			Ceramic capacitor, SMD 0402, X7R, 25V, +/-10%
Not Fitted	C317, C318	0	100n	Kemet	C0402C104K4RACTU	Ceramic capacitor, SMD 0402, X7R, 16V, +/-10%
Not Fitted	J300, J301	0	HMTSW-112-23-F-S-237	SAMTEC	HMTSW-112-23-F-S-237	1x12 pin header, 2.54mm pitch, Pin-in-Paste THM
Not Fitted	J303	0	HMTSW-102-23-F-S-237	SAMTEC	HMTSW-102-23-F-S-237	1x2 pin header, 2.54mm pitch, Pin-in-Paste THM
Not Fitted	R304, R417	0	1M	KOA	RK73H1ETP1004F	Thick film resistor, SMD 0402, 1/16W, 1%