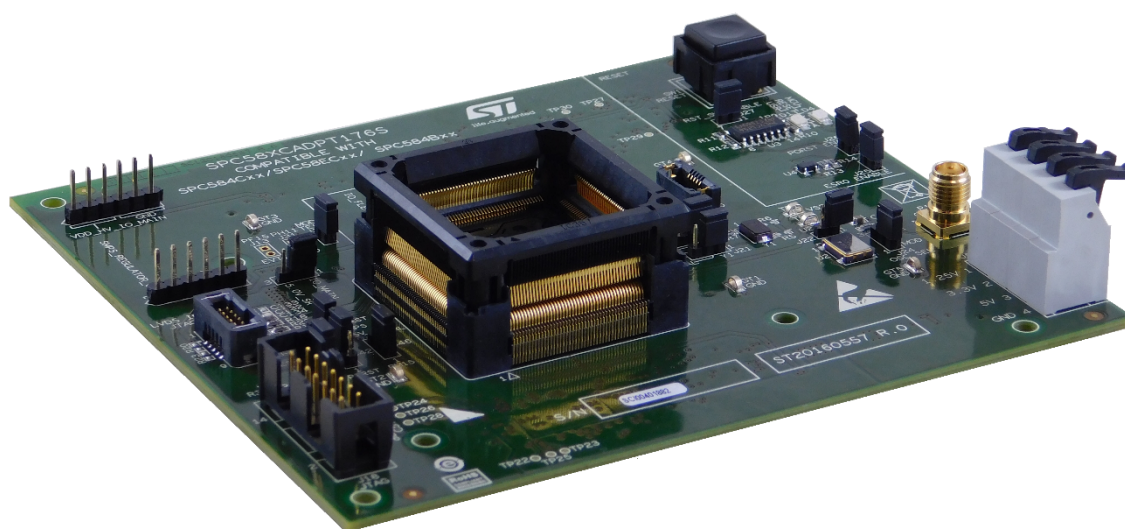


SPC584BADPT176S Rev.A evaluation board

Introduction

The SPC584BADPT176S Rev.A evaluation board supports STMicroelectronics SPC584BxxE7, SPC584CxxE7 and SPC584ECxxE7 microcontrollers in LQFP 176 package.

Figure 1. SPC584BADPT176S Rev.A



Picture is not contractual

1 Overview

The SPC584BADPT176S mini module is an evaluation board supporting STMicroelectronics SPC584BxxE7, SPC584CxxE7 and SPC58ECxxE7 microcontrollers in LQFP176 package.

The mini module is designed to be connected onto the SPC58xxMB motherboard, offering a mechanism for easy customer evaluation of the supported devices, and to facilitate hardware and software development.

The mini module may be used as a stand-alone unit allowing access to the CPU, but no access to the I/O pins as any motherboard peripherals.

Figure 2. Overview of SPC584BADPT176S mini module - top

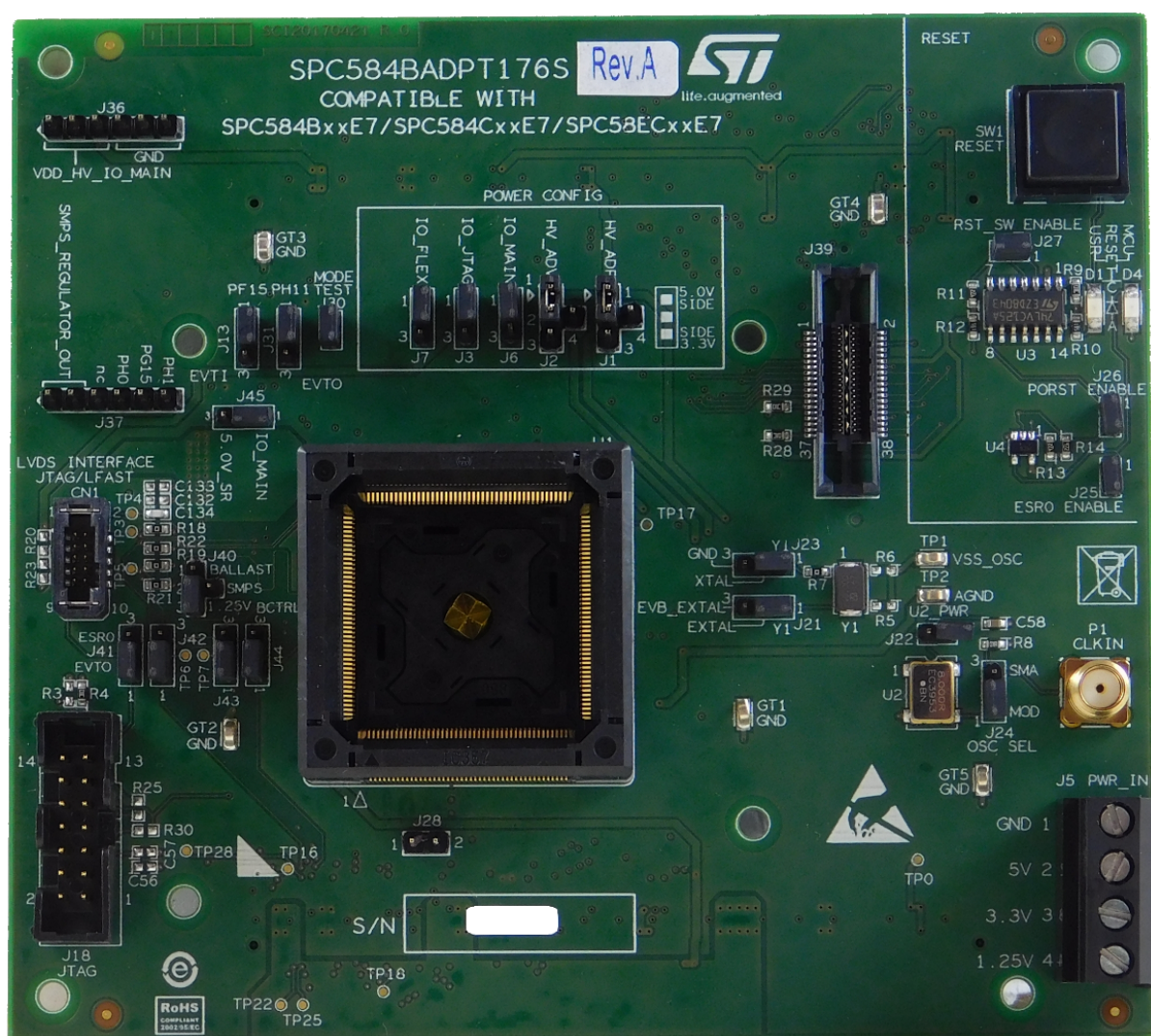
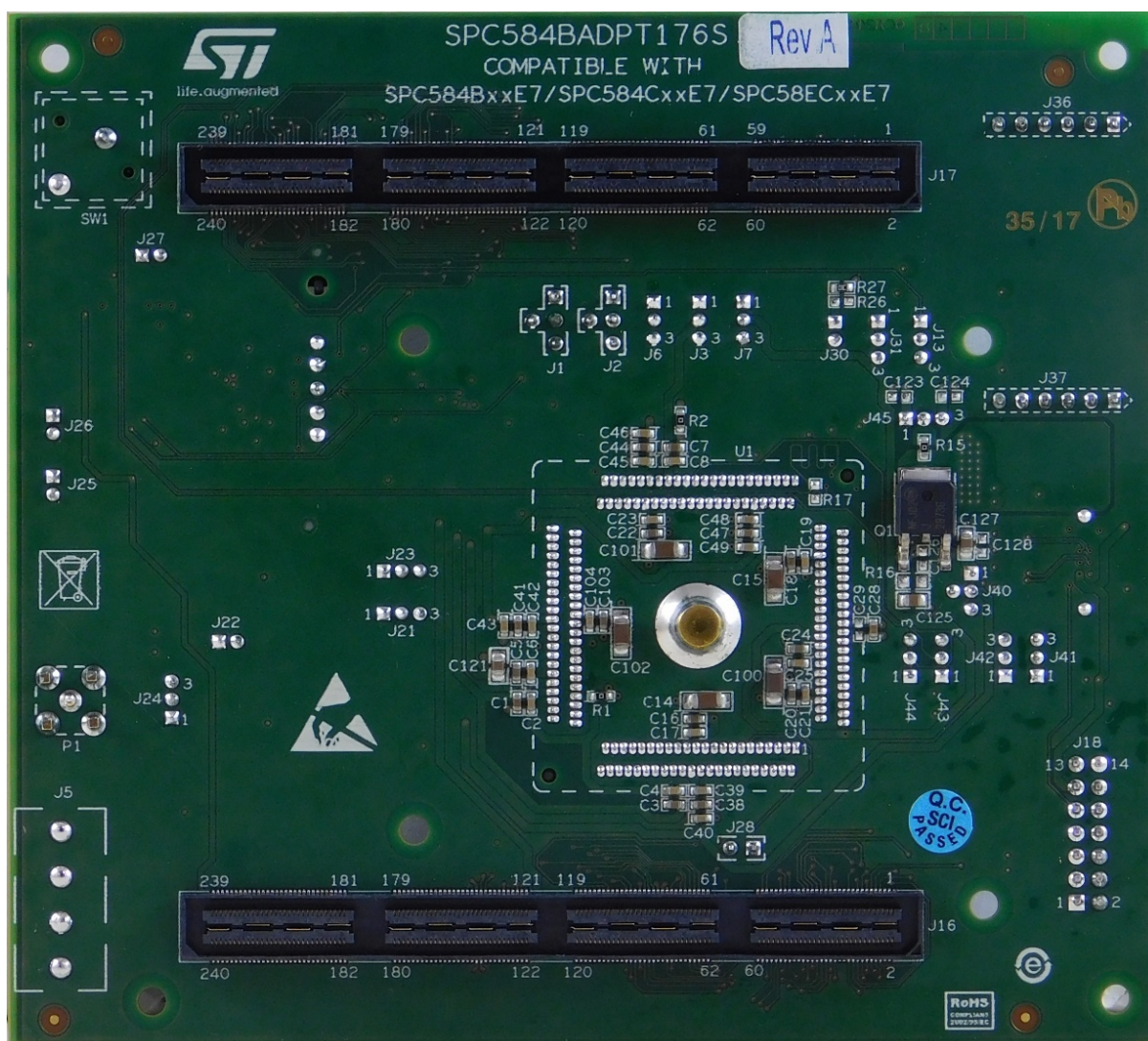


Figure 3. Overview of SPC584BADPT176S mini module - bottom



1.1 Package contents

An SPC584BADPT176S adapter package includes the following item:

- SPC584BADPT176S mini module

1.2 Supported devices

The SPC584BADPT176S mini module supports the following STMicroelectronics family of microcontrollers in LQFP176 package:

- SPC584BxxE7
- SPC584CxxE7
- SPC584ECxxE7

2 License agreement

The packaging of this evaluation board was sealed with a seal stating, “by breaking this seal, you agree to the terms and conditions of the evaluation board license agreement, the terms and conditions of which are available at <http://www.st.com/eb1a>”. Upon breaking the seal, you and STMicroelectronics entered into the evaluation board license agreement, a copy of which is also enclosed with the evaluation board for convenience.

Attention: *This evaluation board only offers limited features for evaluating ST products. It has not been tested for use with other products and is not suitable for any safety or other commercial or consumer application. This evaluation board is otherwise provided “AS IS” and STMicroelectronics disclaims all warranties, express or implied, including the implied warranties of merchantability and fitness for a particular purpose.*

3 Handling precautions

Please take care to handle the package contents in a manner such as to prevent electrostatic discharge.
Before the EVB is used or power is applied, please fully read the following sections on how to correctly configure the board. Failure to correctly configure the board may cause irreparable component, MCU or EVB damage.

4 Hardware description

4.1 Hardware features

The SPC584BADPT176S mini module board has the following features:

- Connector for external power supplies input (5.0 V, 3.3 V, 1.25 V) used in stand-alone mode
- Reset button with driver and led indicator
- Socket for device in eLQFP176 package with exposed pad down
- Debug ports:
 - 38-pin Nexus Mictor connector for Nexus parallel interface
 - 14-pin header connector for JTAG port
 - 12-pin header connector for LFAST interface
- 40 MHz crystal main oscillator with jumpers to optionally disconnect it
- 8 MHz oscillator with jumpers to optionally disconnect it
- Clock input through SMA connector to optionally disconnect it
- 2 X SAMTEC QSH series, 240-way connector to connect mini module to motherboard

4.2 Hardware dimension

The mini module has the following dimensions:

- PCB area: 127 mm X 114.3 mm
- Top components height: 19.4 mm max
- Bottom components height: 3.5 mm max
- PCB thickness: 1.6 mm

5 Power and system configuration

5.1 Power supplies

When the mini module is plugged onto the motherboard, power is supplied directly by the motherboard. In this setup, the external power supply input available on the mini module should NOT be used.

When the SPC584BADPT176S mini module is used as a stand-alone board, external power supplies must be used (5.0 V, 3.3 V, 1.25 V).

The following jumpers are used to configure the power supply:

Table 1. Power configuration jumpers

Jumper	Description	Default	Position
J1	VDD_HV_ADR voltage selection - from 1-2 5.0V_LR 3-2 5.0V_SR 4-2 3.3V_SR	1-2 (5.0V_LR)	Figure 4. SPC584BADPT176S top mini module view - C2
J2	VDD_HV_ADV voltage selection - from 1-2 5.0V_LR 3-2 5.0V_SR 4-2 3.3V_SR	1-2 (5.0V_LR)	Figure 4. SPC584BADPT176S top mini module view - B2
J3	VDD_HV_JTAG voltage selection - from 1-2 5.0V_SR 3-2 3.3V_SR	1-2 (5.0V_SR)	Figure 4. SPC584BADPT176S top mini module view - B2
J6	VDD_HV_IO_MAIN voltage selection - from 1-2 5.0V_SR 3-2 3.3V_SR	1-2 (5.0V_SR)	Figure 4. SPC584BADPT176S top mini module view - B2
J7	VDD_HV_IO_FLEX voltage selection - from 1-2 5.0V_SR 3-2 3.3V_SR	1-2 (5.0V_SR)	Figure 4. SPC584BADPT176S top mini module view - B2
J45	Supply of the BALLAST circuit 1-2 VDD_HV_IO_MAIN 3-2 5.0_SR	1-2 (VDD_HV_IO_MAIN)	Figure 4. SPC584BADPT176S top mini module view - A2
J40	VDD_LV voltage selection - from 1-2 BALLAST circuit 3-2 1.25V_SR 4-2 SMPS_REGULATOR_OUT	2-3 (1.25V_SR)	Figure 4. SPC584BADPT176S top mini module view - A3

5.2 Port configuration

The following jumper need to configure the ports:

Table 2. Ports related jumpers

Jumper	Description	Default	Position
J30	TESTMODE settings	Close	Figure 4. SPC584BADPT176S top mini module view - B2
J13	PH[12]/EVTI connection to QSH motherboard connectors 1-2 PH12 3-2 EVTI	1-2 (PH12)	Figure 4. SPC584BADPT176S top mini module view - A2
J31	PJ[3]/EVTO connection to QSH motherboard connectors. 1-2 PJ3 (allowed) 3-2 EVTO (reserved)	1-2 (PJ3)	Figure 4. SPC584BADPT176S top mini module view - A2
J42	PA8/TDI_TxDATA_N connection to QSH motherboard connectors or LFAST INTERFACE	Close 2-3	Figure 4. SPC584BADPT176S top mini module view - A3
J43	PA9/TDO_RxDATA_P connection to QSH motherboard connectors or LFAST INTERFACE	Close 2-3	Figure 4. SPC584BADPT176S top mini module view - A3
J44	PA14/RDY connection to QSH motherboard connectors or Nexus parallel interface	Close 2-3	Figure 4. SPC584BADPT176S top mini module view - A3
J41	EVTO/ESR0 connection Configuration 1-2 allowed, Configuration 2-3 Reserved.	Close 1-2	Figure 4. SPC584BADPT176S top mini module view - A3

5.3 System clock configuration

The mini module supports the usage of crystal clock sources as well as external clock source:

Table 3. Clock configuration jumpers

Jumper	Description	Default	Position
J21	40 MHz crystal clock source Enable for pin EXTAL	1-2 (XT1 pin2)	Figure 4. SPC584BADPT176S top mini module view - C3
J23	40 MHz crystal clock source Enable for pin XTAL	1-2 (XT1 pin1)	Figure 4. SPC584BADPT176S top mini module view - C3
J22	Enable 8 MHz oscillator power supply	Open	Figure 4. SPC584BADPT176S top mini module view - D3
J24	External clock source from 8 MHz oscillator or SMA connector	1-2 (8 MHz oscillator)	Figure 4. SPC584BADPT176S top mini module view - D3

5.4 Reset circuit

The mini module supports different ways to reset the microcontroller.
To use and perform the reset driving there are different jumpers and switches:

Table 4. Reset configuration jumpers

Jumper	Description	Default	Position
SW1	Reset push button	Open	Figure 4. SPC584BADPT176S top mini module view - D1
J27	Connect the external reset to the reset driver for ESR0 and PORST pins	Close	Figure 4. SPC584BADPT176S top mini module view - D1
J25	Connect the external reset to ESR0 pin	Close	Figure 4. SPC584BADPT176S top mini module view - D2
J26	Connect the external reset to PORST pin	Close	Figure 4. SPC584BADPT176S top mini module view - D2

5.5 Test points

The mini module has several test points. Below all test point description:

Table 5. Test points

Test point	Description	Position
TP0	VDD_HV_IO_MAIN test point	Figure 4. SPC584BADPT176S top mini module view - D4
TP1	VSS_OSC test point	Figure 4. SPC584BADPT176S top mini module view - D3
TP2	AGND test point	Figure 4. SPC584BADPT176S top mini module view - D3
TP3	JCOMP_RxDATA_N/PA[5] test point	Figure 4. SPC584BADPT176S top mini module view - A2
TP4	TCK/PA[6] test point	Figure 4. SPC584BADPT176S top mini module view - A2
TP5	TMS_TxDATA_P/PA[7] test point	Figure 4. SPC584BADPT176S top mini module view - A3
TP6	TDI_TxDATA_N/PA[8] test point	Figure 4. SPC584BADPT176S top mini module view - A3
TP7	TDO_RxDATA_P/PA[9] test point	Figure 4. SPC584BADPT176S top mini module view - A3
TP16	PA[0] test point	Figure 4. SPC584BADPT176S top mini module view - A4
TP17	PB8	Figure 4. SPC584BADPT176S top mini module view - C3
TP18	PE3	Figure 4. SPC584BADPT176S top mini module view - B4
TP22	J16A, QSH connector, pin10 test point	Figure 4. SPC584BADPT176S top mini module view - A4
TP25	J16A, QSH connector, pin12 test point	Figure 4. SPC584BADPT176S top mini module view - B4
TP28	J16A, QSH connector, pin11 test point	Figure 4. SPC584BADPT176S top mini module view - A4

5.6 Connectors

The mini module has other connectors described in the below table.

Table 6. Other connectors

Connectors	Description	Position
J20	12-pin header connector for SIPI interface	Figure 4. SPC584BADPT176S top mini module view - C2
J18	14-pin header connector for JTAG port	Figure 4. SPC584BADPT176S top mini module view - A4
CN1	12-pin SAMTEC connector for JTAG/LFAST LVDS interface	Figure 4. SPC584BADPT176S top mini module view - A3
J36, J37	DC-DC Regulator Module	Figure 4. SPC584BADPT176S top mini module view - A1/A2
J16, J17	2 X SAMTEC QSH series, 240-way connector to connect mini module to motherboard	Figure 5. SPC584BADPT176S bottom mini module view

6 Layout overview

Figure 4. SPC584BADPT176S top mini module view

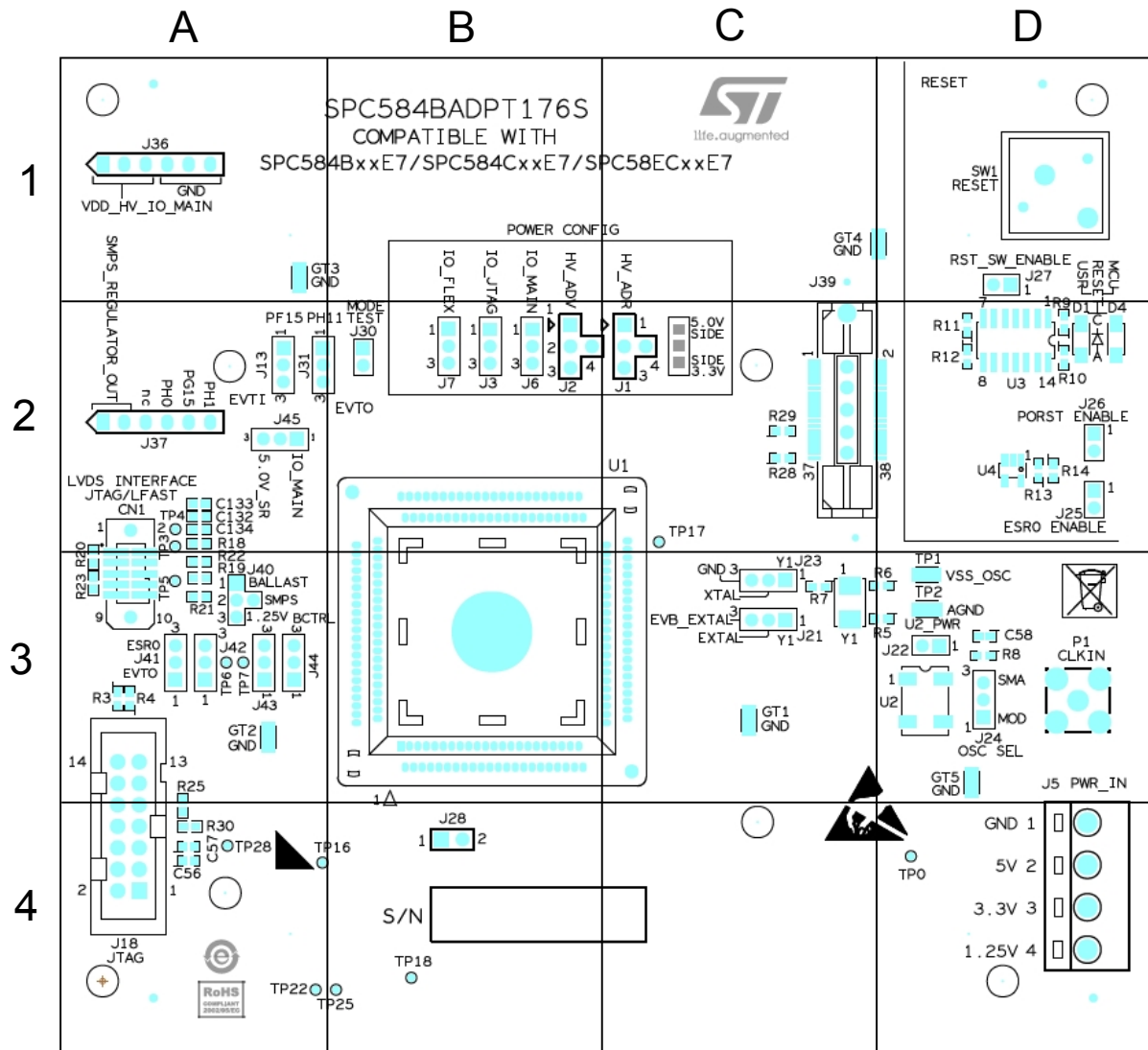
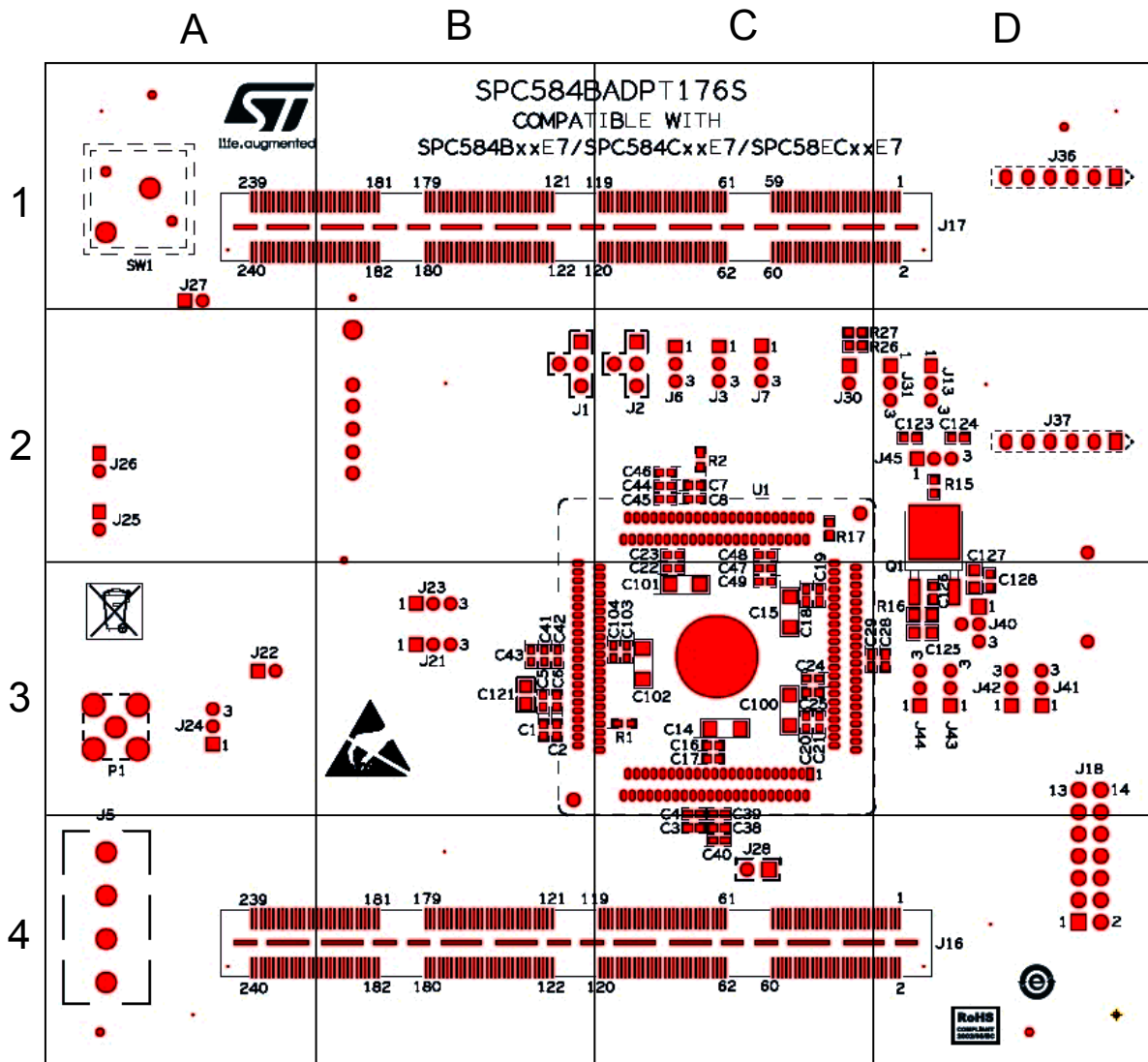


Figure 5. SPC584BADPT176S bottom mini module view



7 BOM

Table 7. BOM

Item	Qty	Reference	Manufacturer code	Value	Part description
1	1	CN1	TFM-105-02-L-D-WT	Samtec TFM-105-02-L-D-WT	Samtec 5x2 TFM connector - 1.27 mm pitch - - with weld tabs
2	11	C1, C3, C5, C7, C16, C18, C20, C22, C24, C58, C103	GCM188R71H104KA57D	100 nF	Mult. cer. cap. 50V 0603
3	14	C2, C4, C6, C8, C17, C19, C21, C23, C25, C39, C42, C45, C48, C104	GCM188R71H103KA37D	10 nF	Mult. cer. cap. 50V 0603 (Automotive Series)
4	5	C14, C15, C100, C101, C102	GRM31CR71H475KA12L	4.7 uF	Mult. cer. cap. 50V 1206
5	1	C28	GRM188R71E105KA12D	1 uF	Mult. cer. cap. 25V 0603
6	1	C29		DNM	Mult. cer. cap. 50V 0603 (Automotive Series) - not mounted
7	4	C38, C41, C44, C47	GCM188R71H473KA55D	47 nF	Mult. cer. cap. 50V 0603
8	4	C40, C43, C46, C49	C0603C225K4PAC	2.2 uF	Mult. cer. cap. 16V 0603
9	2	C56, C57		DNM	Mult. cer. cap. 50V 0603 - not mounted
10	3	C121, C125, C127	GCM21BR71C225KA64L	2.2 uF	Mult. cer. cap. 16V 0805 - Automotive Series
11	4	C123, C124, C126, C128		DNM	Mult. Cer. cap. 50V 0603 - do not mount
12	2	C132, C133		DNM	Mult. cer. cap. 50V 0603 - not mounted
13	1	C134	C0603C270J5GAC	27 pF	Mult. cer. cap. 50V 0603
14	1	D1	HSMY-C150	Yellow	Led diode yellow 1206
15	1	D4	HSMS-C150	Red	Led diode red 1206
16	7	TP1, GT1, TP2, GT2, GT3, GT4, GT5		TEST POINT	SMD PCB test point
17	1	J1, J2		STRIP3+1PM	Strip male 3+1 pin - see mech part
18	3	J3, J6, J7, J13, J21, J23, J24, J31, J41, J42, J43, J44, J45		STRIP 2 mm	Male strip 3 poles, single row, vertical, golden, pitch 2 mm - see mech parts
19	1	J5	31072104	METZ 31072104	CONN METZ CONNECT 4 POLI 16A 31072104
20	2	J16, J17	SAM-QSH12001LDA	Samtec QSH-120-01-L-D-A	Samtec 0.5mm pitch High Speed Socket
21	1	J18	N2514-6002RB	N2514-6002RB	3M conn flat male 14 pins, straight - pitch 2.54 mm
22	0	J22 (included in J3)		STRIP 2 mm	Male strip 2 poles, single row, vertical, golden, pitch 2 mm - see mech parts
23	0	J25, J26, J27, J30 (included in J3)		STRIP 2 mm	Male strip 2 poles, single row, vertical, golden, pitch 2 mm - see mech Parts

Item	Qty	Reference	Manufacturer code	Value	Part description
24	1	J28		STRIP2PM	Strip male 2 pin
25	0	J36, J37		STRIP6PM	Strip male 6 pin
26	1	J39	5767054-1	5767054-1	Conn female 38 Pin, 180°, MICTOR - GND
27	0	J40 (included in J3)		STRIP 2mm	Male Strip 4 poles, single row, vertical, golden, pitch 2 mm - See mech parts
28	1	P1	SMA-J-P-H-ST-TH1	CON 1 SMA	Female RF SMA 180°
29	1	Q1	NJD2873T4G	NJD2873	NPN plastic power transistor DPAK
30	8	R1, R2, R7, R15, R18, R19, R21, R22		0R	Resistor 1/10W 1% 0603
31	4	R3, R26		DNM	Resistor 1/10W 1% 0603 - not mounted
32	3	R4, R9, R27	CR1J10KF-MR	10K	Resistor 1/10W 1% 0603
33	2	R5, R6		DNM	Resistor 1/10W 1% 0603 - not mounted
34	1	R8		100R	Resistor 1/10W 1% 0603
35	2	R10, R12	CRCW0603560RFKEA	560R	Resistor 1/10W 1% 0603
36	3	R11, R13, R14		4K7	Resistor 1/10W 1% 0603
37	1	R16		DNM	Resistor 1/10W 1% 0805 - do not mount
38	1	R17		DNM	Resistor 1/10W 1% 0603 - not mounted
39	4	R20, R23, R25, R30		DNM	Resistor 1/10W 1% 0603 - not mounted
40	2	R28, R29	CR1J10KF-MR	10K	Resistor
41	1	SW1		Pushbutton	Pushbutton NO B6110-0
42	12	TP3, TP4, TP5, TP6, TP7, TP16, TP17, TP18, TP22, TP25, TP28, TP0		TEST POINT	Testpoinr SMD - ignore
43	1	U1			eQFP176(A0A4) - YAMAICHI IC357-1764-168P-2
44	1	U2	ECS-3953M-080-BN-TR	8 MHz	Hybrid quartz osc ECS 3953M
45	1	U3	74LVC125AMTR	74LVC125AMTR	I.C. low voltage CMOS quad bus buffers - SO14
46	1	U4	74V1G08STR	74V1G08STR	CMOS AND gate
47	1	Y1	NX5032GA	40 MHZ	Quartz 40MHz NX5032GA XTAL NDK
48	1	CSSG20170421 R.0		MINIMODULE	SPC584BADPT176S-CHORUS 2M EQFP176
49	2	J1, J2			Bridge 2 pins female 2.54 mm pitch
50	19	J3, J6, J7, J13, J21, J23, J24, J31, J41, J42, J43, J44, J45, J22, J25, J26, J27, J30, j40			Bridge 2 pins female 2 mm pitch

UM2756
Schematics

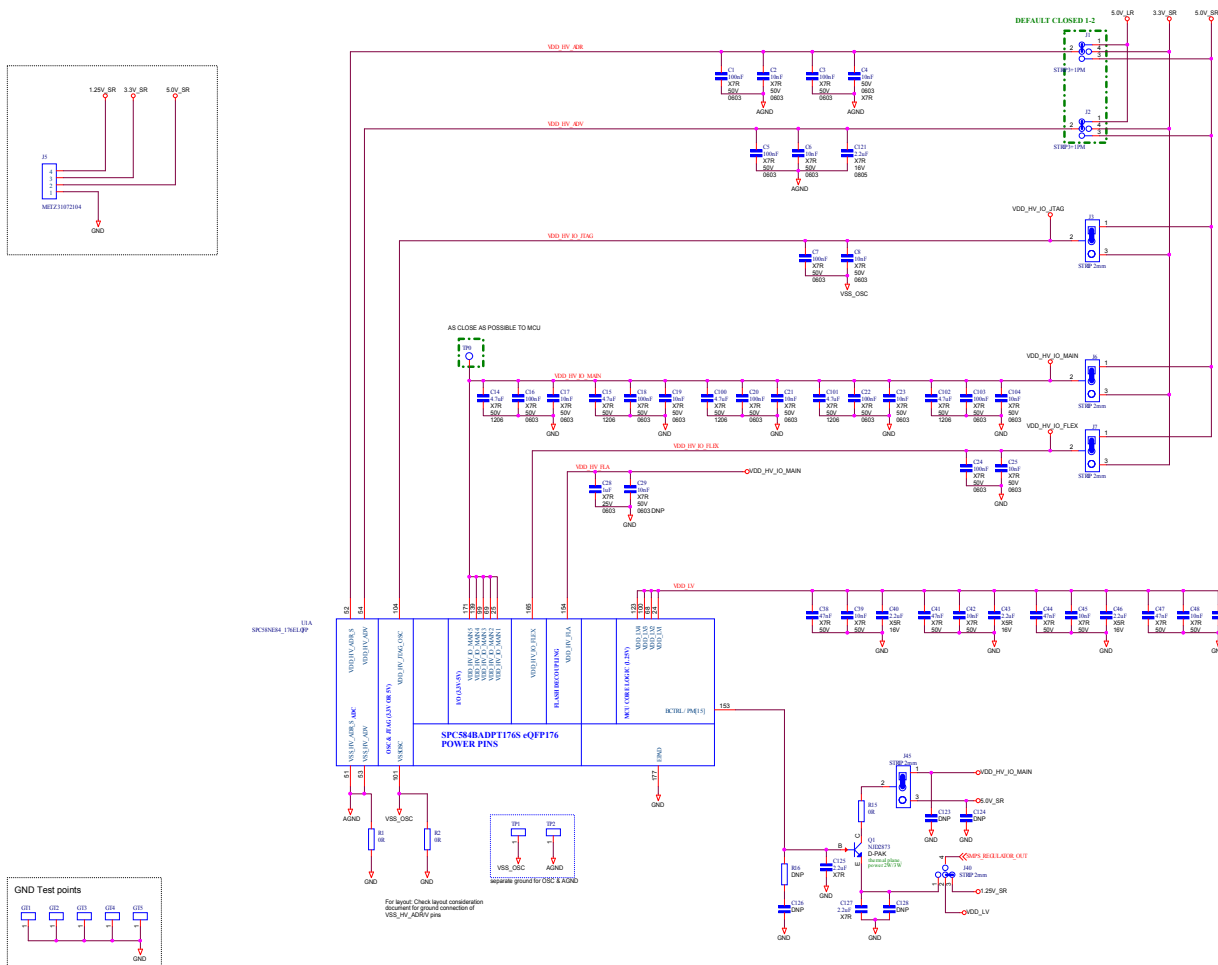


Figure 7. Microcontroller I/O

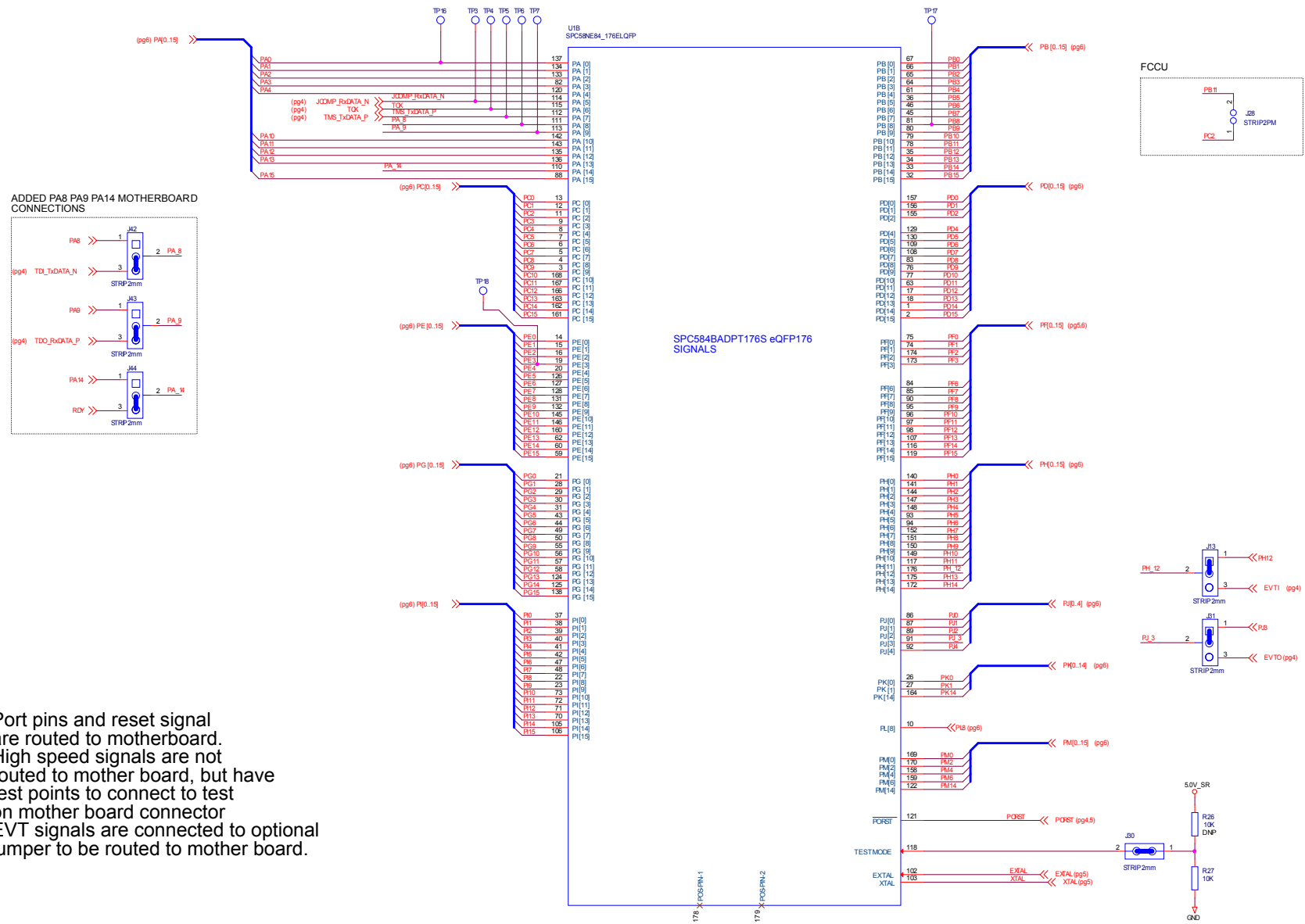


Figure 8. JTAG, JTAG LFAST and Nexus

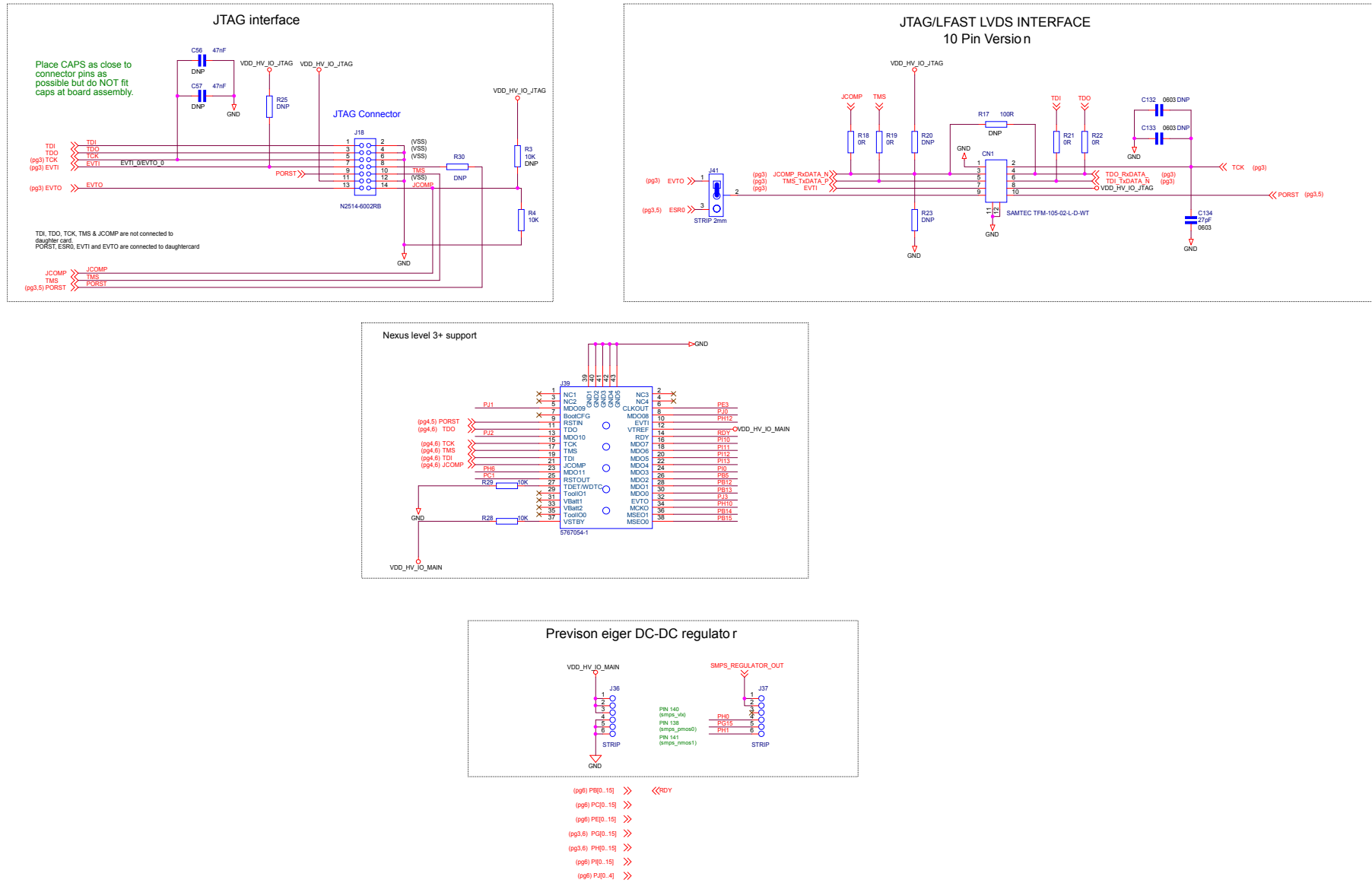
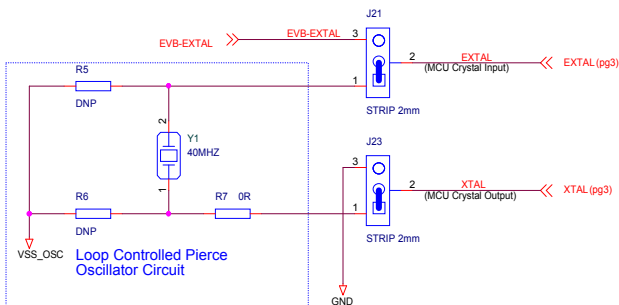


Figure 9. Clock and reset circuit

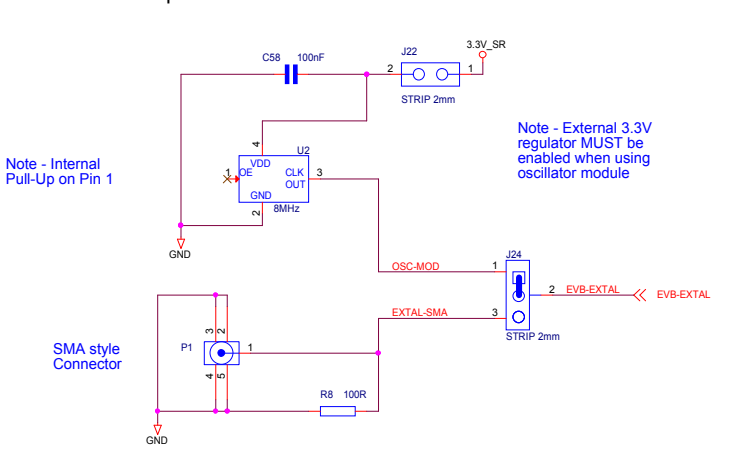
External oscillator



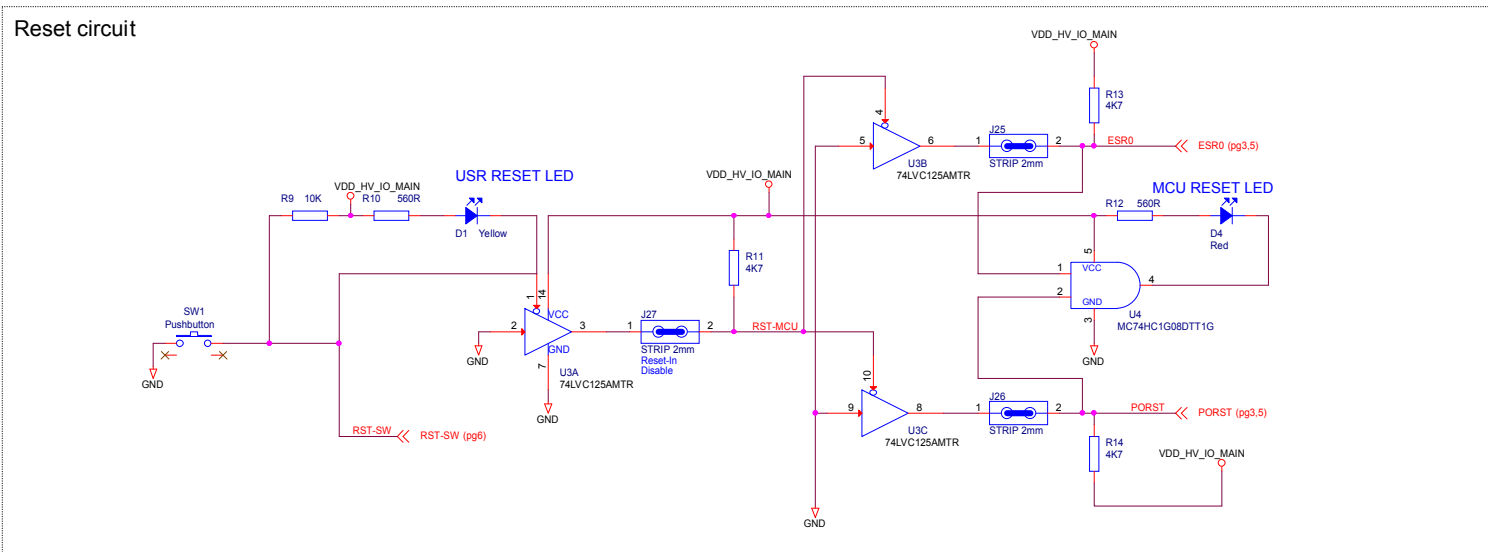
REMOVE XTAL jumper when driving EXTERNAL from Oscillator Module or External Source (PLL Enabled)

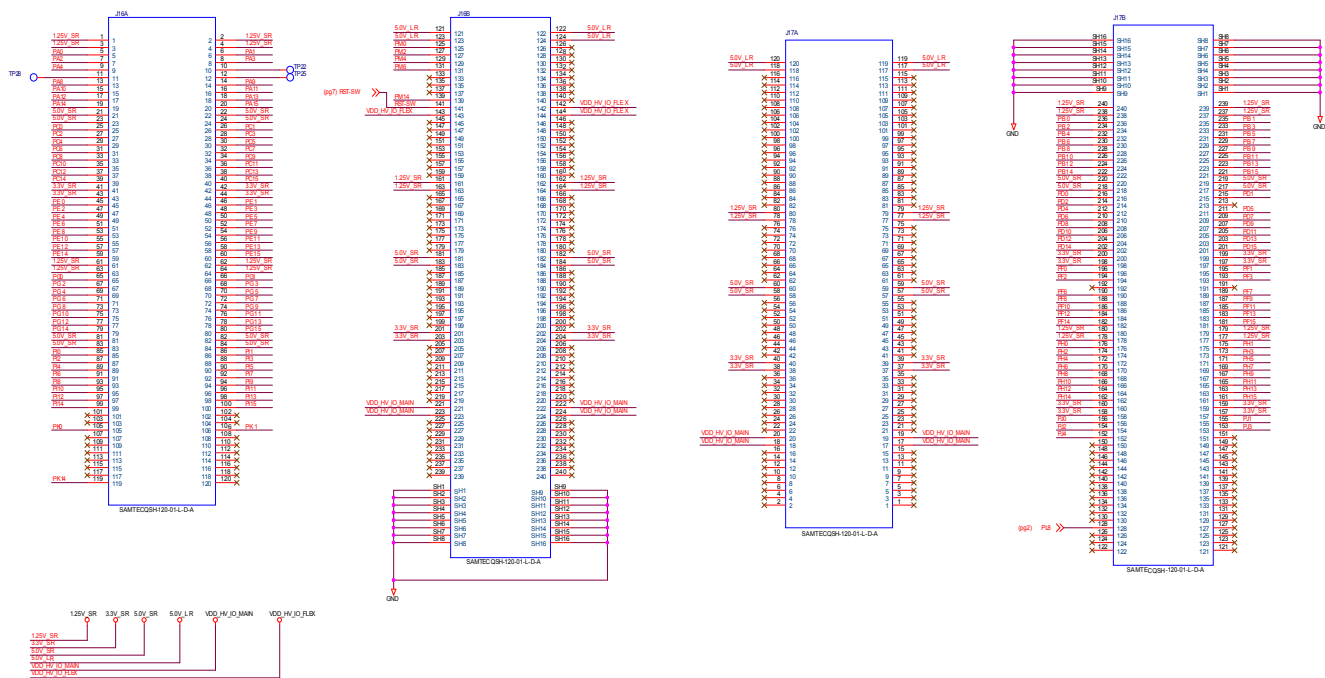
Connect XTAL jumper to GND when driving EXTERNAL from Oscillator Module or External Source (PLL Bypass Mode)

External clock input



Reset circuit





Revision history

Table 8. Document revision history

Date	Version	Changes
05-Aug-2020	1	Initial release.

Contents

1	Overview	2
1.1	Package Contents	3
1.2	Supported Devices	3
2	License agreement	4
3	Handling precautions	5
4	Features	6
4.1	Hardware features	6
4.2	Hardware dimension	6
5	Power and system configuration	7
5.1	Power supplies	7
5.2	Port configuration	8
5.3	System clock configuration	8
5.4	Reset circuit	9
5.5	Test points	9
5.6	Connectors	10
6	Layout overview	11
7	BOM	13
8	Schematics	15
	Revision history	20

List of tables

Table 1.	Power configuration jumpers	7
Table 2.	Ports related jumpers	8
Table 3.	Clock configuration jumpers	8
Table 4.	Reset configuration jumpers	9
Table 5.	Test points	9
Table 6.	Other connectors	10
Table 7.	BOM	13
Table 8.	Document revision history	20

List of figures

Figure 1.	SPC584BADPT176S Rev.A	1
Figure 2.	Overview of SPC584BADPT176S mini module - top	2
Figure 3.	Overview of SPC584BADPT176S mini module - bottom.	3
Figure 4.	SPC584BADPT176S top mini module view	11
Figure 5.	SPC584BADPT176S bottom mini module view.	12
Figure 6.	Microcontroller power	15
Figure 7.	Microcontroller I/O.	16
Figure 8.	JTAG, JTAG LFAST and Nexus	17
Figure 9.	Clock and reset circuit	18
Figure 10.	Board connector	19

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2020 STMicroelectronics – All rights reserved