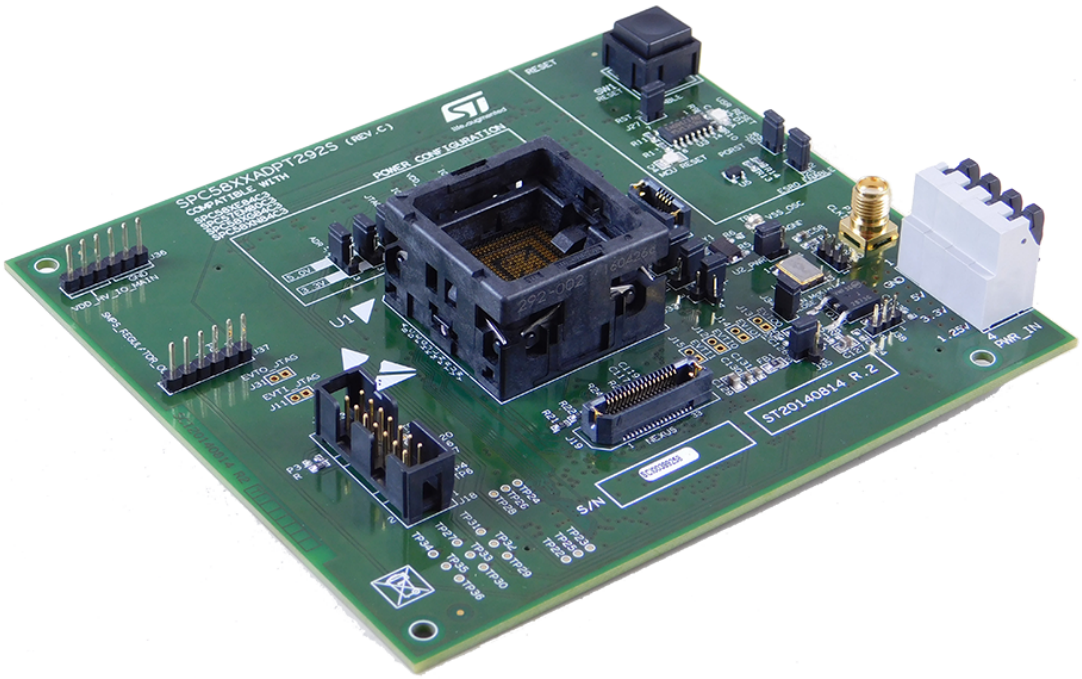
SPC58XXADPT292S Rev. C evaluation board

Introduction

The evaluation board SPC58XXADPT292S Rev. C "mini module" supports STMicroelectronics SPC58XE84C3, SPC57EM80C3, SPC58XG84C3 and SPC58XN84C3 microcontrollers in FPBGA292 package.

Figure 1. SPC58XXADPT292S Rev. C



Note: picture is not contractual.

1 Overview

The "mini module" is an evaluation board supporting STMicroelectronics SPC58XE84C3, SPC57EM80C3, SPC58XG84C3 and SPC58XN84C3 microcontrollers in FPBGA292 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 SPC58XXADPT292S Rev. C "mini module" - top

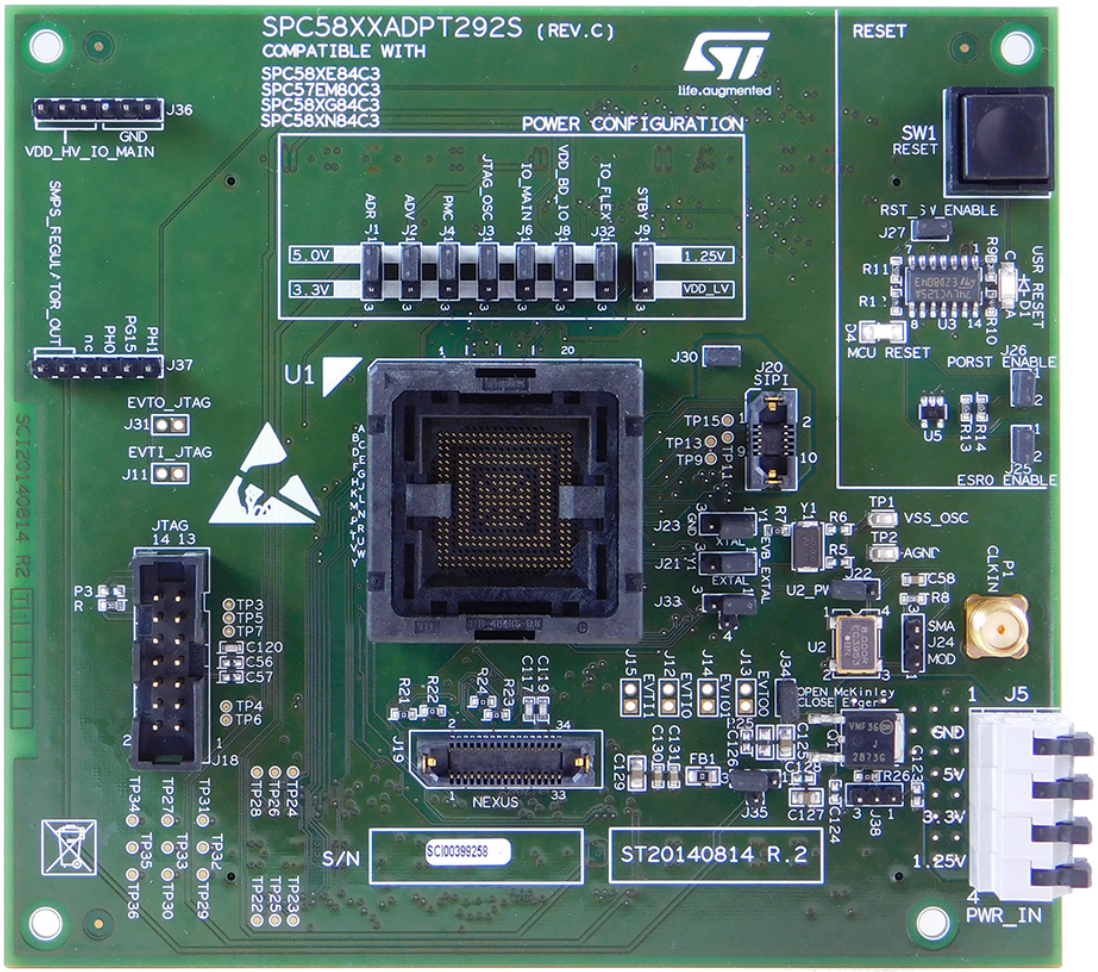
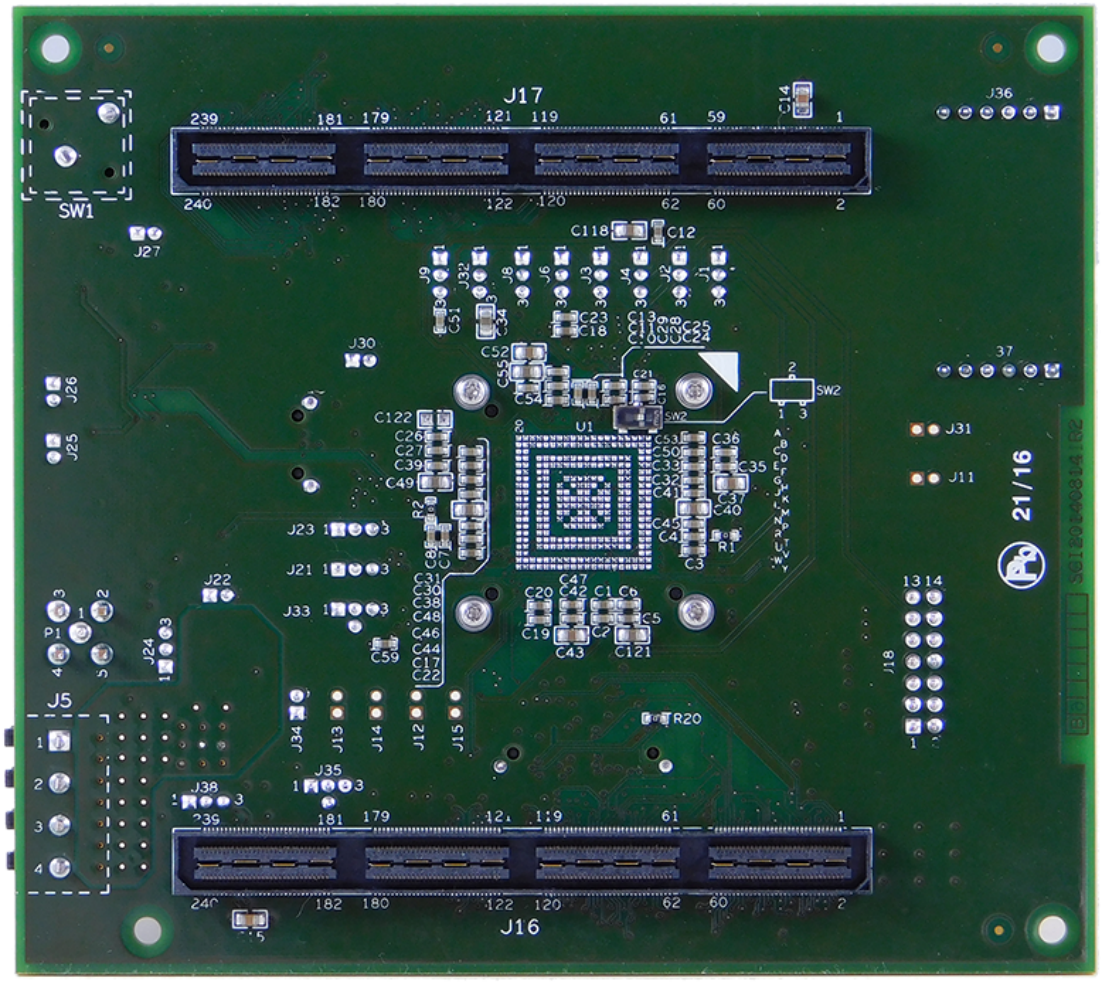


Figure 3. **Overview of SPC58XXADPT292S Rev. C "mini module" - bottom**



1.1 Package contents

An SPC58XXADPT292S Rev. C adapter package includes the following item:

- SPC58XXADPT292S Rev. C "mini module"

1.2 Supported devices

The "mini module" supports the following STMicroelectronics family of microcontrollers in FPBGA292 package:

- SPC58XE84C3
- SPC57EM80C3
- SPC58XG84C3
- SPC58XN84C3

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 www.st.com/ebla ". 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 "mini module" has the following features:

- Connector for external power supplies input (5 V, 3.3 V, 1.25 V) used in stand-alone mode.
- Reset button with driver and led indicator
- Socket for device in FPBGA292 package with exposed pad down
- Debug ports:
- – 34-pin SAMTEC connector for Nexus 2
  – 14-pin header connector for JTAG port
  – 10-pin header connector for SIPI 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 "mini module" is used as a stand-alone board, external power supplies must be used (5 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 configuration from 5.0V_LR or 3.3V_SR	1-2 (5.0V_LR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B2
J2	VDD_HV_ADV voltage configuration from 5.0V_LR or 3.3V_SR	1-2 (5.0V_LR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B2
J3	VDD_HV_JTAG_OSC voltage configuration from 5.0V_SR or 3.3V_SR	1-2 (5.0V_SR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B2
J4	VDD_HV_PMC voltage configuration from 5.0V_SR or 3.3V_SR	1-2 (5.0V_SR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B2
J6	VDD_HV_IO_MAIN voltage configuration from 5.0V_SR or 3.3V_SR	1-2 (5.0V_SR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B2
J32	VDD_HV_IO_FLEX voltage configuration from 5.0V_SR or 3.3V_SR	1-2 (5.0V_SR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
J8	VDDPHYIO voltage configuration from 5.0V_SR or 3.3V_SR	1-2 (5.0V_SR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
J9	VDD_LV_STBY voltage configuration from 1.25V_SR or VDD_LV	1-2 (1.25V_SR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
J35	VDD_LV voltage configuration from: • BALLAST circuit • 1.25V_SR SMPS_REGULATOR_OUT	2-3 (1.25V_SR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C4
J38	Supply for BALLAST circuit configuration from VDD_HV_IO_MAIN or 5.0V_SR	1-2 (VDD_HV_IO_MAIN)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D2

5.2 MicrocoIntroller configuration

The jumpers described in the following table needs to configure the board to use STMicroelectronics microcontroller SPC57EM80C3.

Table 2. Microcontroller SPC57EM80C3 configuration related jumpers

Jumper	Description	Default	Position
J33	Device ball T11 VDDSTBY function configuration	2-3 (Connect VDDSTBY with 3.3_SR)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
J34	Device ball N19 NC function configuration	Open (Device ball N19 Not Connected)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
SW2	Device ball E15&D16 VDD_HV_FLA supply configuration	2-3 (Disconnect VDD_HV_FLA from VDD_HV_IO_MAIN)	Figure 5. SPC58XXADPT292S Rev. C bottom "mini module" view - C2

The jumpers described in the following table need to configure the board to use STMicroelectronics microcontrollers SPC58NE84C3, SPC58XG84C3 and SPC58XN84C3.

Table 3. SPC58NE84C3, SPC58XG84C3 and SPC58XN84C3 jumpers

Jumper	Description	Default	Position
J33	Device ball T11 EXTREG_SEL function configuration: • 2-1 (DISABLE BALLAST) • 2-4 (ENABLE BALLAST)	2-1 (DISABLE BALLAST)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
J34	Device ball N19 NC function configuration	Close (Connect BCTRL with BALLAST Circuit)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
SW2	Device ball E15&D16 VDD_HV_FLA supply configuration	2-1 (Connect VDD_HV_FLA with VDD_HV_IO_MAIN)	Figure 5. SPC58XXADPT292S Rev. C bottom "mini module" view - C2

5.3 Port configuration

The following jumper need to configure the ports:

Table 4. Ports related jumpers

Jumper	Description	Default	Position
J30	TESTMODE settings	Close	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
J11	PF[15]/EVTI connection to QSH motherboard connectors	Open	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A2
J31	PH[11]/EVTO connection to QSH motherboard connectors	Open	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A2
J12	PM[4]/EVTI0 connection to QSH motherboard connectors	Open	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
J13	PM[5]/EVTO0 connection to QSH motherboard connectors	Open	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
J14	PM[6]/EVTO1 connection to QSH motherboard connectors	Open	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
J15	PK[14]/EVTI1 connection to QSH motherboard connectors	Open	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3

5.4 System clock configuration

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

Table 5. Clock configuration jumpers

Jumper	Description	Default	Position
J21	40 MHz crystal clock source Enable for pin EXTAL	1-2 (XT1 pin2)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
J23	40 MHz crystal clock source Enable for pin XTAL	1-2 (XT1 pin1)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C3
J22	Enable 8 MHz oscillator power supply	Open	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D3
J24	External clock source from 8 MHz oscillator or SMA connector	1-2 (8 MHz oscillator)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D3

5.5 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 6. Reset configuration jumpers

Jumper	Description	Default	Position
SW1	Reset push button	Open	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D1
J27	Connect the external reset to the reset driver for ESR0 and PORST pins	Close	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D1
J25	Connect the external reset to ESR0 pin	Close	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D2
J26	Connect the external reset to PORST pin	Close	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D2

5.6 Test points

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

Table 7. Test points

Test Point	Description	Position
TP1	VSS_OSC test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D3
TP2	AGND test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D3
TP3	JCOMP test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A3
TP4	TCK test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A3
TP5	TMS test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A3
TP6	TDI test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A3
TP7	TDO test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A3
TP9	SIPI_RXN test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
TP11	SIPI_TXN test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
TP13	SIPI_RXP test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
TP15	SIPI_TXP test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
TP22	J16A, QSH connector, pin10 (PA5) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP23	J16A, QSH connector, pin14 (PA9) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B4
TP24	J16A, QSH connector, pin19 (PA14) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B4
TP25	J16A, QSH connector, pin12 (PA7) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B4
TP26	J16A, QSH connector, pin13 (PA8) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B4
TP27	J17B, QSH connector, pin209 (PD7) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP28	J16A, QSH connector, pin11 (PA6) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP29	J17B, QSH connector, pin210 (PD6) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP30	J17B, QSH connector, pin183 (PF13) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP31	J17B, QSH connector, pin151 (PJ5) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP32	J17B, QSH connector, pin149 (PJ7) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP33	J17B, QSH connector, pin127 (PL9) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP34	J17B, QSH connector, pin125 (PL11) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP35	J17B, QSH connector, pin123 (PL13) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
TP36	J17B, QSH connector, pin121 (PL15) test point	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4

5.7 Connectors

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

Table 8. Other connectors

Connectors	Description	Position
J20	10-pin header connector for SIPI interface	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - C2
J18	14-pin header connector for JTAG port	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A4
J19	34-pin SAMTEC connector for Nexus 2	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - B4
J36, J37	DC-DC Regulator Module	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - A1/A2
J16, J17	2 X SAMTEC QSH series, 240-way connector to connect "mini module" to Motherboard	Figure 5. SPC58XXADPT292S Rev. C bottom "mini module" view
J5	External power supplies input (5V, 3.3V, 1.25V)	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D4
P1	SMA Connector for External Clock Input	Figure 4. SPC58XXADPT292S Rev. C top "mini module" view - D3

6 Layout overview

Figure 4. **SPC58XXADPT292S Rev. C top "mini module" view**

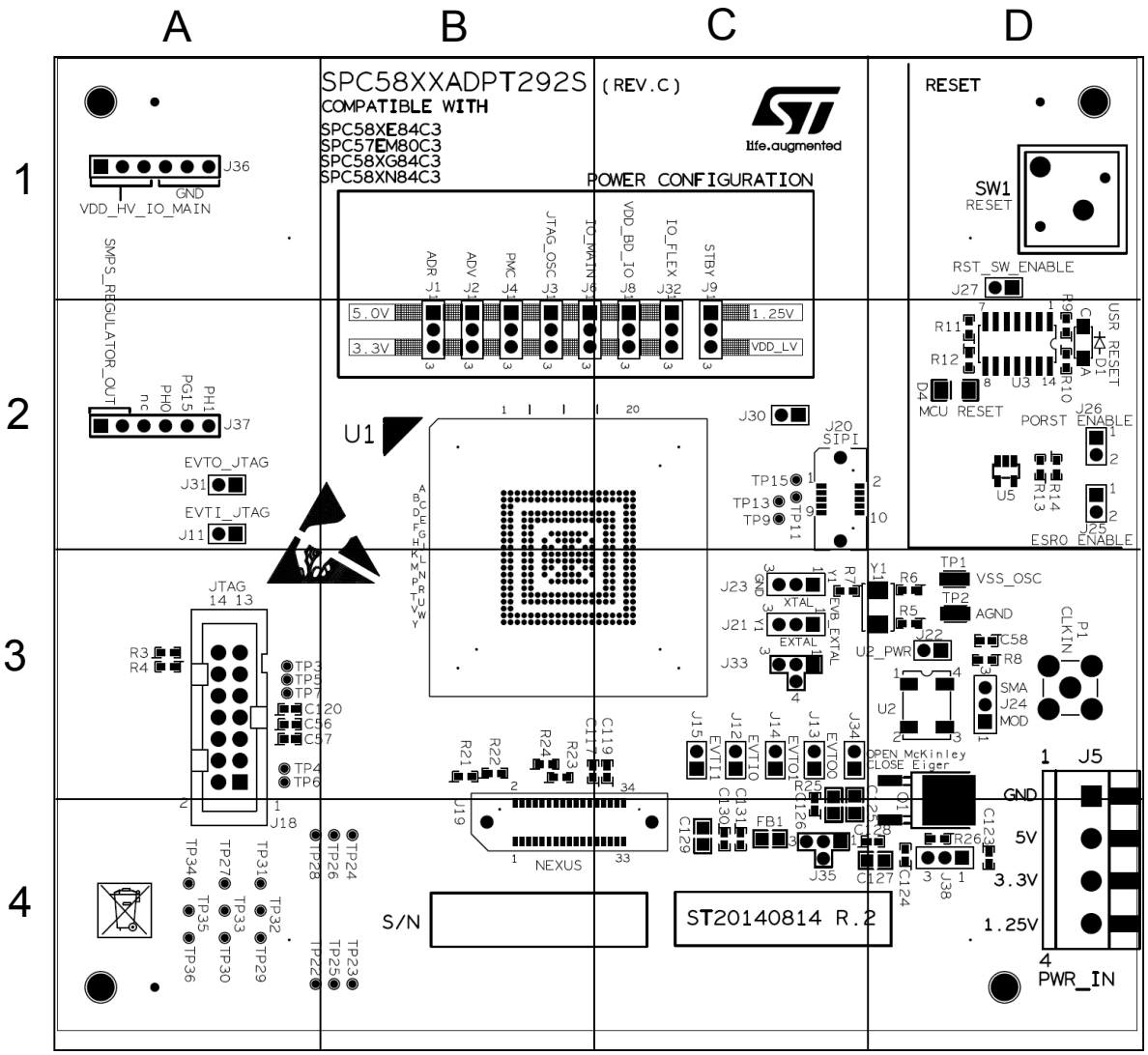
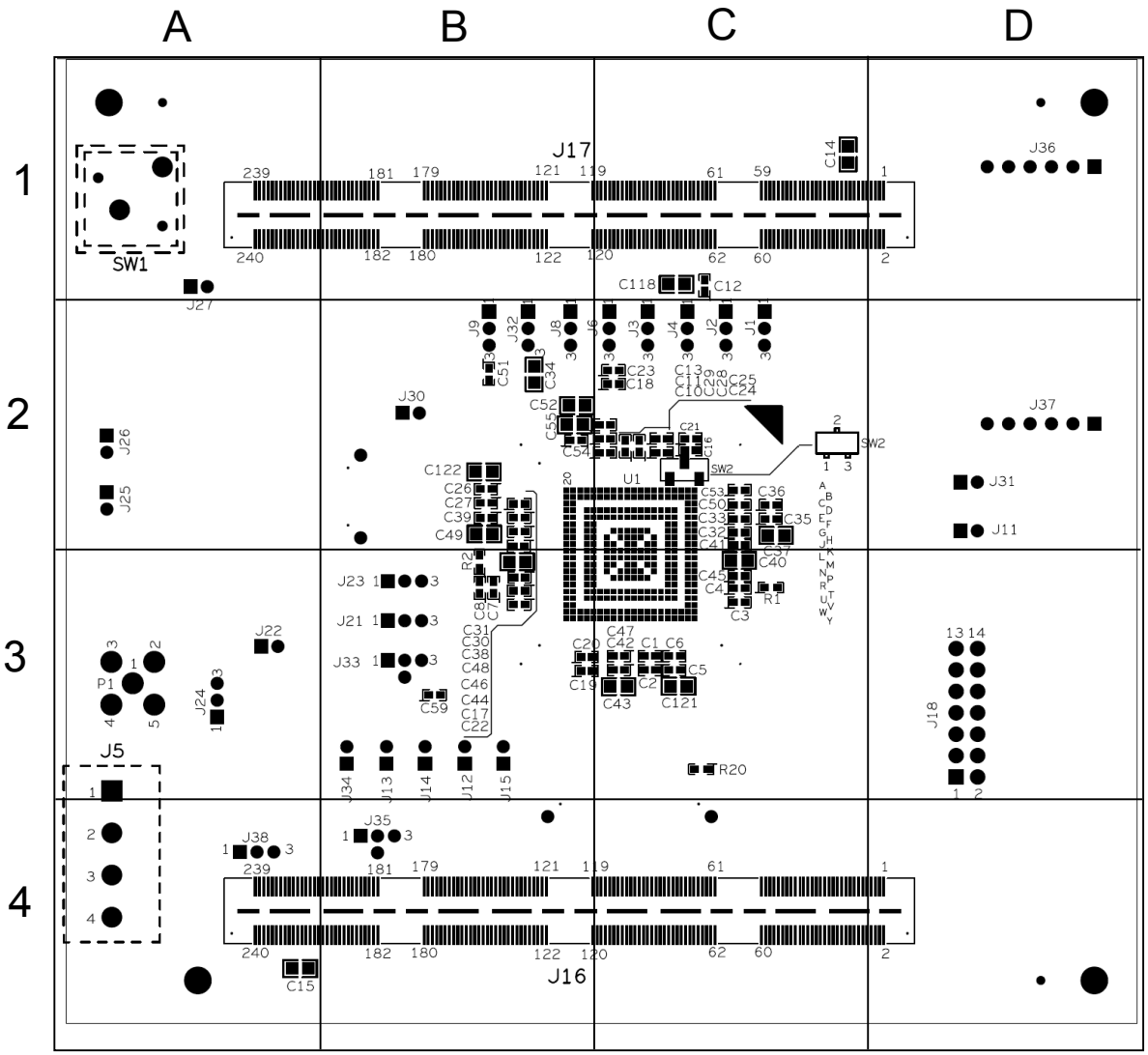


Figure 5. **SPC58XXADPT292S Rev. C bottom "mini module" view**



7 BOM

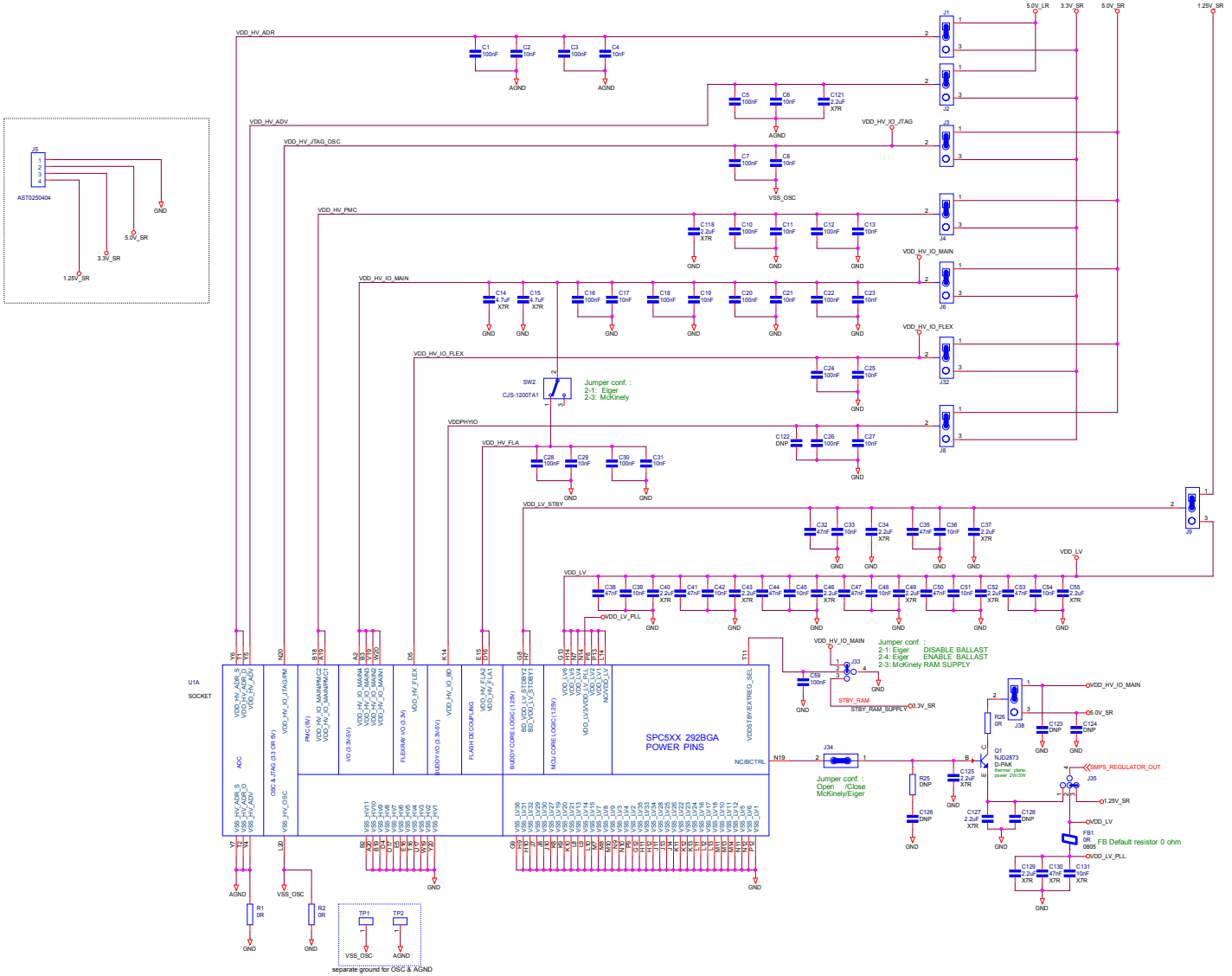
Table 9. **BOM**

Item	Qty	Reference	Manufacturer code	Value	Part description
1	16	C1, C3, C5, C7, C10, C12, C16, C18, C20, C22, C24 ,C26, C28, C30, C58, C59		100 nF	Mult. cer. cap. 50V 0603
2	23	C2, C4, C6, C8, C11, C13, C17, C19 ,C21, C23, C25, C27, C29, C31, C33, C36, C39, C42, C45, C48, C51, C54, C131		10 nF	Mult. cer. cap. 50V 0603 (automotive series)
3	2	C14, C15		4.7 µF	Mult.cer. cap. 16V 0805
4	9	C32, C35, C38, C41, C44, C47, C50,C53, C130		47 nF	Mult. cer. cap. 50V 0603
5	13	C34, C37, C40, C43, C46, C49, C52, C55, C118, C121, C125, C127, C129		2.2 µF	Mult. cer. cap. 16V 0805 - automotive series
6	2	C56, C57		47 pF	Mult. cer. cap. 50V 0603 - do not mount
7	2	C117, C119		100 pF	Mult. cer. cap. 50V 0603
8	1	C120		27 pF	Mult. cer. cap. 50 V 0603
9	1	C122		DNM	Mult. cer. cap. 0805 - do not mount
10	4	C123, C124, C126, C128		DNM	Mult. cer. cap. 50V 0603 - do not mount
11	1	D1		Yellow	Led diode yellow 1206
12	1	D4		Red	Led diode red 1206
13	1	FB1		0R	Resistor 1/10W 1% 0805
14	4	J1, J2, J3, J4, J6, J8, J9, J21, J22, J23, J24, J25, J26, J27, J30, J32, J33, J34, J35, J38		STRIP 2 mm	Male strip, single row, vertical, golden, pitch 2 mm
15	1	J5	AST0250404		Conn 4 pin, 90°, AST board mount screwless
16	6	J11, J12, J13, J14, J15, J31		STRIP 2mm	Male strip 20 poles, single row, vertical, golden, pitch 2 mm - do not mount
17	2	J16, J17	Samtec QSH-120-01-L-D-A		Samtec 0.5 mm pitch high speed socket
18	1	J18	N2514-6002RB		3M conn flat male 14 pins, straight - pitch 2.54 mm
19	1	J19	Samtec ASP-137973-01		Samtec 0.8 mm pitch - connector SMD 17x2 - NEXUS connector
20	1	J20	ERF8-005-05.0-L-DV-L-TR		Samtec 0.8 mm pitch rugged high speed female connector
21	1	J36, J37		STRIP	Male strip 36 pins pitch 2.54 180°
22	1	P1		CON 1 SMA	Female RF SMA 180°

Item	Qty	Reference	Manufacturer code	Value	Part description
23	1	Q1	NJD2873		NPN plastic power transistor DPAK
24	9	R1, R2, R7, R20, R21, R22, R23, R24, R26		0R	Resistor 1/10W 1% 0603
25	1	R3		10K	Resistor 1/10W 1% 0603 - do not mount
26	2	R4, R9		10K	Resistor 1/10W 1% 0603
27	2	R5, R6		0R	Resistor 1/10W 1% 0603 - Do not mount!
28	1	R8		100R	Resistor 1/10W 1% 0603
29	2	R10, R12		560R	Resistor 1/10W 1% 0603
30	3	R11, R13, R14		4K7	Resistor 1/10W 1% 0603
31	1	R25		DNM	Resistor 1/10W 1% 0805 - Do not mount!
32	1	SW1		Pushbutton	Pushbutton NO
33	1	SW2	CJS-1200TA1	CJS-1200TA1	CJS Microswitch slide SPDT SMD J-Lead (1-2 closing)
34	2	TP1, TP2		Testpoint SMD	PCB Test Point
35	24	TP3, TP4, TP5, TP6, TP7, TP9, TP11, TP13, TP15, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35, TP36		TEST POINT	Testpoint SMD - ignore
36	1	U1	OTB-292(484RS)-0.8-002	SOCKET	Socket for BGA292 - OTB-292(484RS)-0.8-002 ENPLAS
37	1	U2		8 MHz	Hybrid quartz osc ECS 3953M
38	1	U3	74LVC125AMTR		I.C. Low Voltage CMOS quad bus buffers - SO14
39	1	U5	74V1G08STR		I.C. single 2-input and gate - SMD SOT23-5L
40	1	Y1	NX5032GA	40 MHZ	Quartz 40 MHz NX5032GA XTAL NDK

8 Schematics

Figure 6. Microcontroller power



For layout: Check layout consideration document for ground connection of VSS_HV_ADR/V pins

Figure 7. Microcontroller I/O

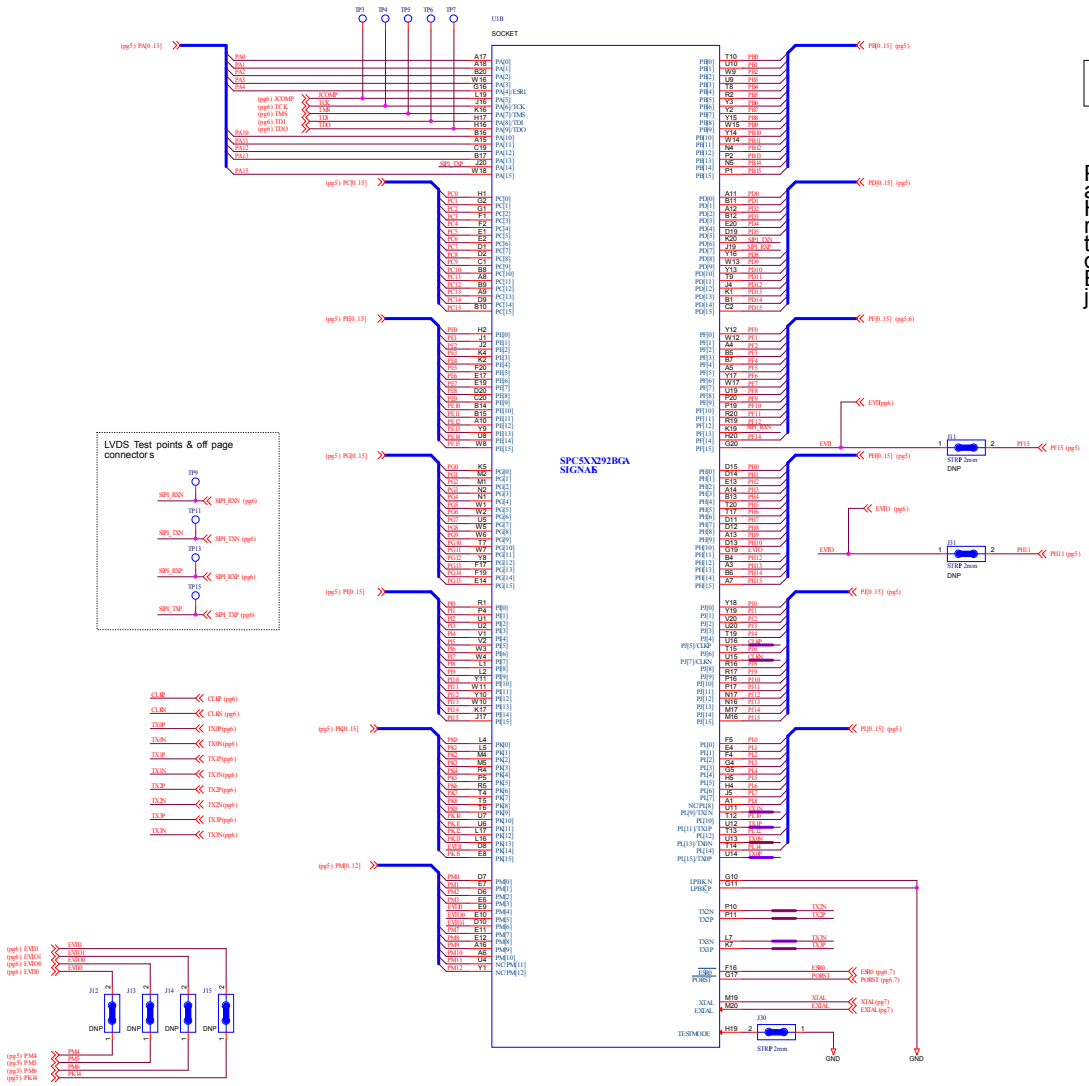


Figure 8. Board connector

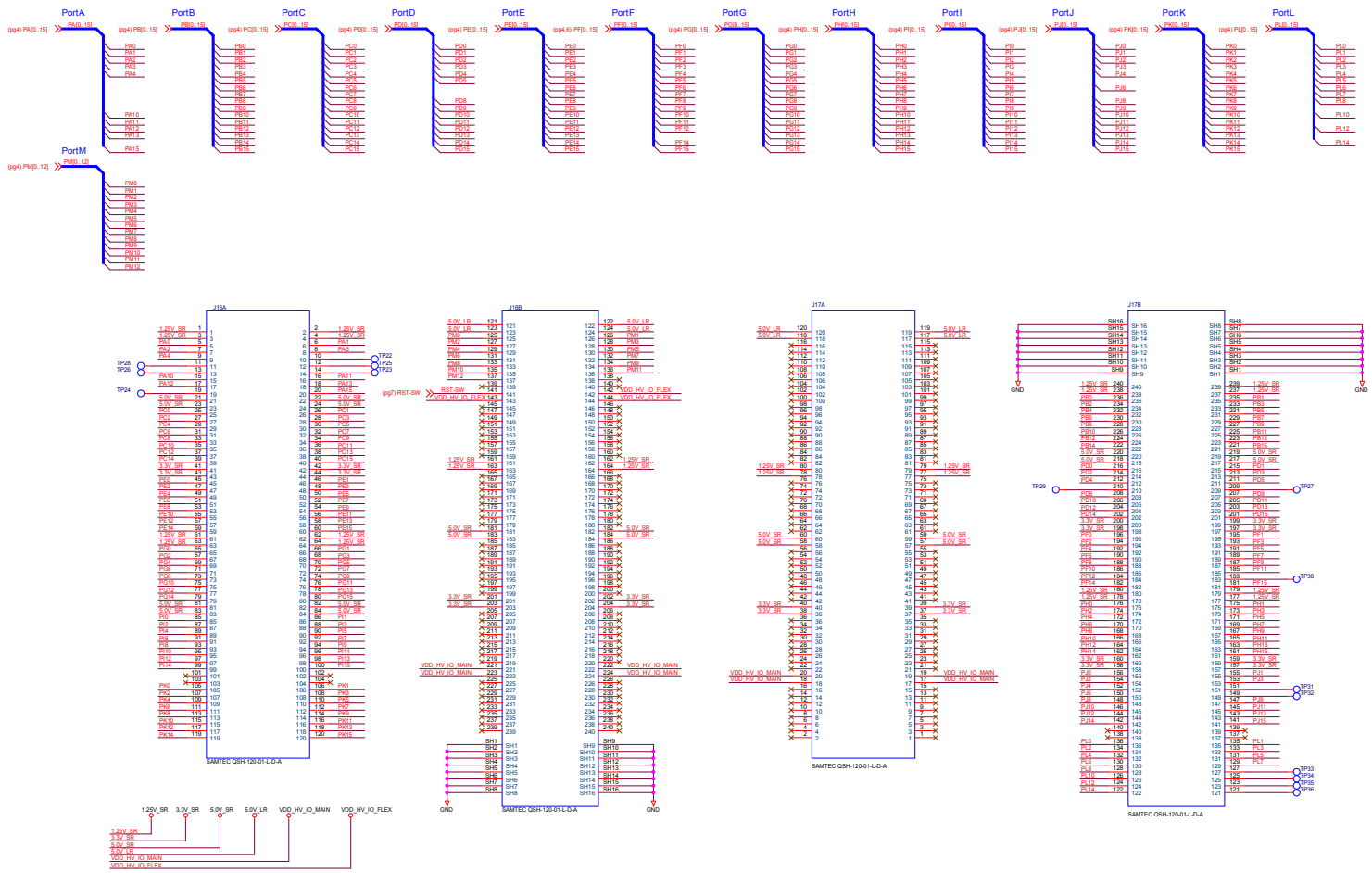


Figure 9. JTAG, Nexus and SIPI

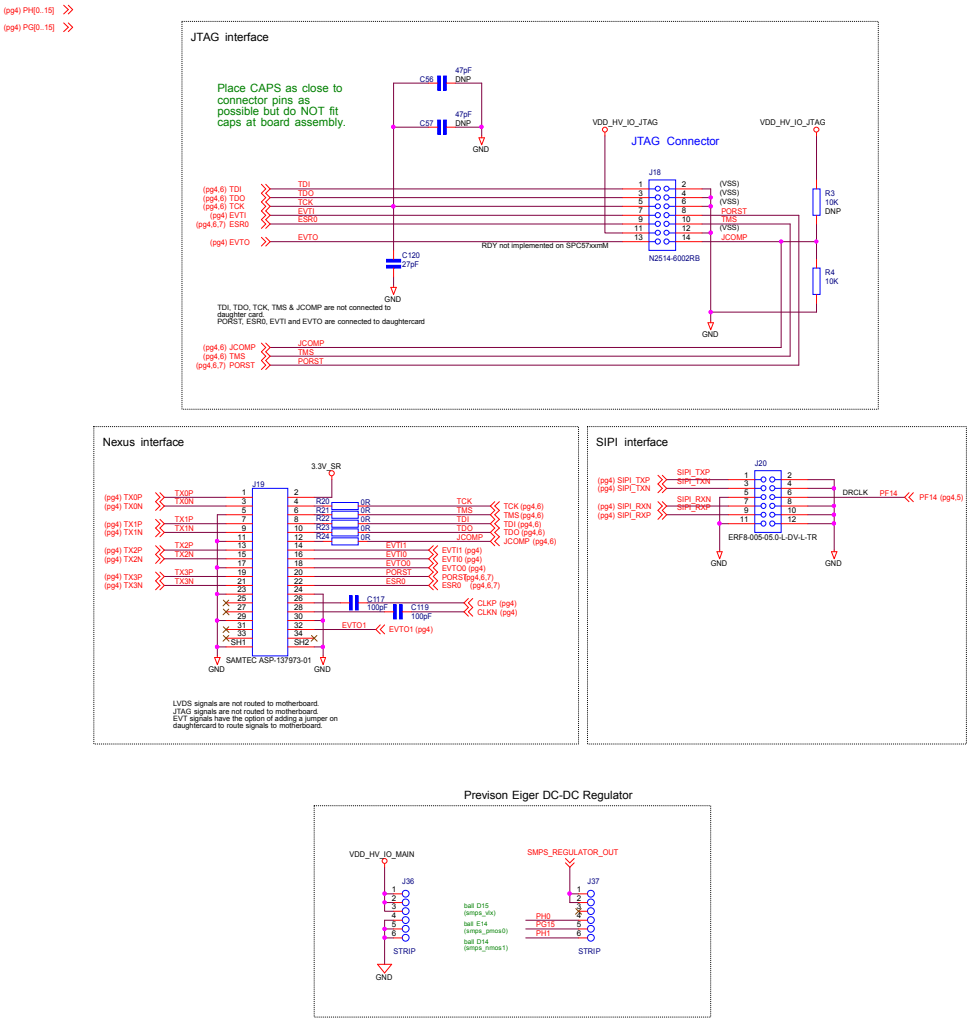
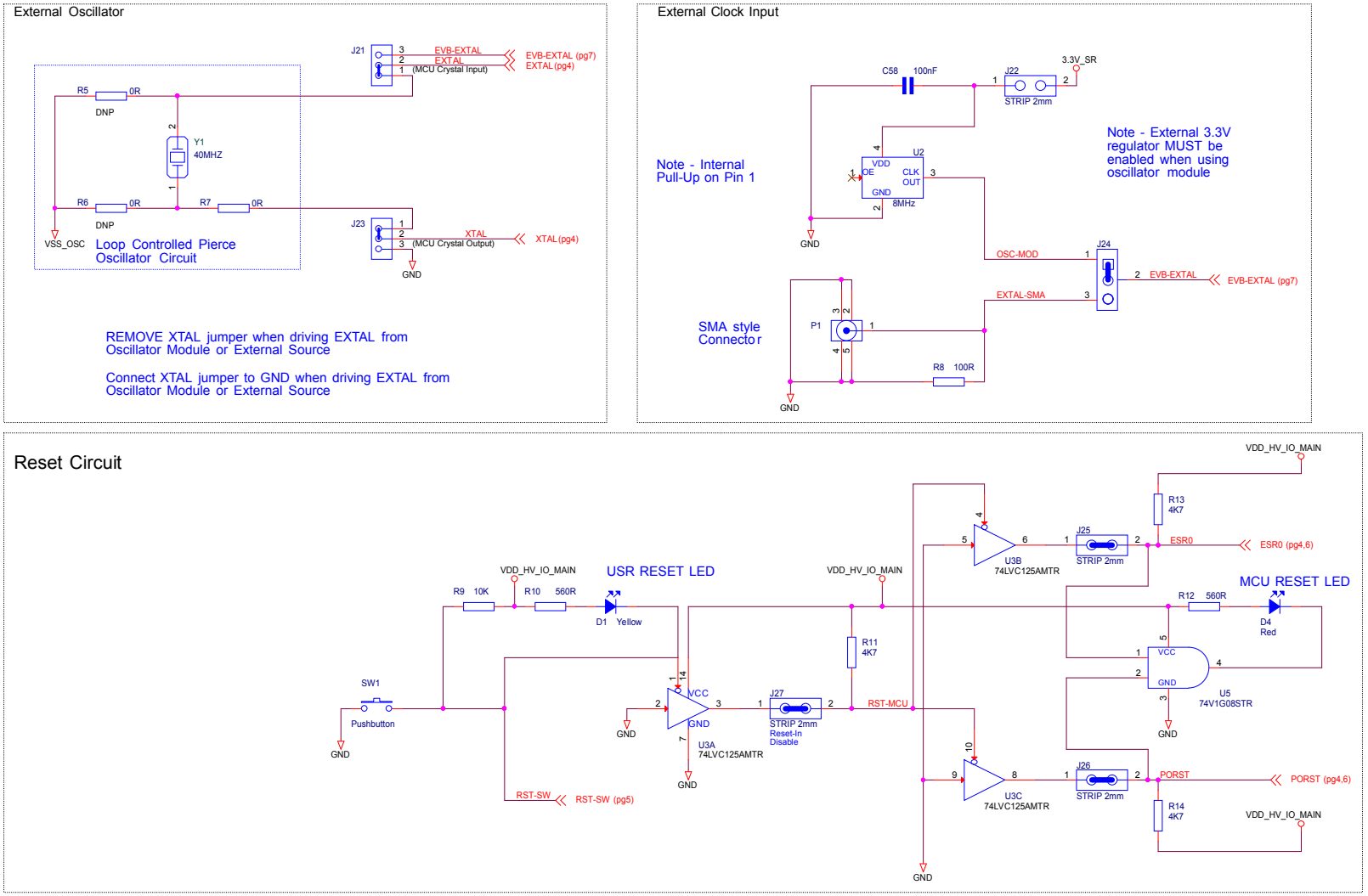


Figure 10. Clock and reset circuit



Revision history

Table 10. **Document revision history**

Date	Version	Changes
04-Jan-2021	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 MicrocoIntroller configuration 8
5.3 Port configuration 9
5.4 System clock configuration 10
5.5 Reset circuit 10
5.6 Test points 11
5.7 Connectors 12
6 **Layout overview** 13
7 **BOM** 15
8 **Schematics** 17
Revision history 22

List of tables

Table 1. Power configuration jumpers . . . 7
Table 2. Microcontroller SPC57EM80C3 configuration related jumpers . . . 8
Table 3. SPC58NE84C3, SPC58XG84C3 and SPC58XN84C3 jumpers . . . 8
Table 4. Ports related jumpers . . . 9
Table 5. Clock configuration jumpers . . . 10
Table 6. Reset configuration jumpers . . . 10
Table 7. Test points . . . 11
Table 8. Other connectors . . . 12
Table 9. BOM . . . 15
Table 10. Document revision history . . . 22

List of figures

Figure 1. SPC58XXADPT292S Rev. C . . . 1
Figure 2. Overview of SPC58XXADPT292S Rev. C "mini module" - top . . . 2
Figure 3. Overview of SPC58XXADPT292S Rev. C "mini module" - bottom . . . 3
Figure 4. SPC58XXADPT292S Rev. C top "mini module" view . . . 13
Figure 5. SPC58XXADPT292S Rev. C bottom "mini module" view . . . 14
Figure 6. Microcontroller power . . . 17
Figure 7. Microcontroller I/O . . . 18
Figure 8. Board connector . . . 19
Figure 9. JTAG, Nexus and SIPI . . . 20
Figure 10. Clock and reset circuit . . . 21