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SDP-H1 Controller Board

INTRODUCTION

This user guide describes the EVAL-SDP-CH1Z system demonstration platform-high speed (SDP-H1) controller board from Analog Devices, Inc. The SDP-H1 controller board is part of the Analog Devices system demonstration platform (SDP). The SDP consists of a series of controller boards, interposer boards, and daughter boards.

SDP controller boards provide a means of communicating with the PC from the system under evaluation. Interposer boards route signals between two connectors. Daughter boards are a collection of product evaluation boards and Circuits From The Lab™ (CFTL) reference circuit boards. The SDP-H1 is used as part of the evaluation system for many Analog Devices components and reference circuits. The primary audience for this user guide is a system engineer who seeks to understand how to set up the SDP-H1 board and begin USB communications to the PC.

The SDP-H1 board is designed to be used in conjunction with various Analog Devices component evaluation boards and Circuits From The Lab reference circuits as part of a customer evaluation environment. The SDP-H1 provides USB connectivity through a USB 2.0 high speed connection to the computer allowing users to evaluate components on this platform from a PC application. The SDP-H1 has a Xilinx Spartan-6 FPGA and an ADSP-BF527 Blackfin processor. The Xilinx Spartan-6 FPGA connects to an FMC low pin count (LPC) connector. This connector provides power to the daughter board (see the Power section for more details) and LVDS and LVCMOS signal support. The Blackfin processor peripherals communication lines are available through an SDP 120-pin small footprint connectors. The Blackfin processor also provides the USB controller for the board and allows the user to configure the FPGA.

The SDP-H1 user guide provides instructions for installing the SDP-H1 hardware (EVAL-SDP-CH1Z board) and software onto your computer. The necessary installation files are provided with the evaluation daughter board package. The Getting Started section provides software and hardware installation procedures, PC system requirements, and basic board information. The Hardware Description section provides information on the EVAL-SDP-CH1Z components. The EVAL-SDP-CH1Z schematics are provided in the Schematics section.

PLEASE SEE THE LAST PAGE FOR AN IMPORTANT
WARNING AND LEGAL TERMS AND CONDITIONS.

TABLE OF CONTENTS

Introduction 1
Revision History 2
Product Overview 3
Technical or Customer Support 3
Product Information 3
Regulatory Compliance 3
Getting Started 4
Package Contents 4
PC Configuration 4
USB Installation 4
Powering Up/Powering Down the SDP 4
Hardware Description 5
LEDs 5
SDP Connector Details 5
FMC Connector Details 10
SMA Connectors 15
Power 15
Mechanical Specifications 15
Schematics 17

REVISION HISTORY

4/13—Revision 0: Initial Version

PRODUCT OVERVIEW

The SDP-H1 board features

- Xilinx Spartan-6 FPGA
- DDR2
  - Micron MT47H32M16HR-25E:G – 8Mb × 16 bits × 4 Banks (512 Mb/64 MB)
- SRAM
  - ISSI IS61WV25616BLL-10BLI – 256Kb × 16 bits (4 Mb/512 Kb)
- 1 × 160-pin FMC-LPC connector. (For further information, see the VITA 57 specification *FMC Marketing Alliance* available from VITA Technologies.)
  - Samtec ASP-134603-01
  - Up to 1,080 Mb/s LVDS
  - Single-ended LVCMOS
  - Power
- Analog Devices ADSP-BF527 Blackfin processor
  - Core performance up to 600 MHz
  - 208-ball CSP-BGA package
  - 5 Mb of internal RAM memory
- 24 MHz CLKIN oscillator
- 32 Mb flash memory
  - Numonyx M25P32
- SDRAM memory
  - Micron MT48LC16M16A2P-6A – 16 Mb × 16 bits (256 Mb/32 MB)
- 1 × 120-pin small foot print connectors
  - Hirose FX8-120P-SV1(91), 120-pin header
- 4 × footprints for SMA connectors
  - 1 × pair of footprints for external differential clock
  - 1 × pair of footprints for external differential trigger
- Blackfin processor peripherals exposed
  - SPI
  - SPORT
  - TWI/I²C
  - GPIO
  - PPI
  - Asynchronous parallel
  - Timers

For more information, go to http://www.analog.com/sdp.

TECHNICAL OR CUSTOMER SUPPORT

You can reach Analog Devices customer support in the following ways:

- Visit the SDP website at http://www.analog.com/sdp
- Email processor questions to
  - processor.support@analog.com (worldwide support)
  - processor.europe@analog.com (Europe support)
  - processor.china@analog.com (China support)
- Phone questions to 1-800-ANALOGD
- Contact your Analog Devices local sales office or authorized distributor.
- Send questions by mail to
  Analog Devices, Inc.
  Three Technology Way
  P.O. Box 9106
  Norwood, MA 02062-9106
  USA

PRODUCT INFORMATION

Product information can be obtained from the Analog Devices website.

Analog Devices Website

The Analog Devices website, www.analog.com, provides information about a broad range of products—analog integrated circuits, amplifiers, converters, and digital signal processors.

Note that MyAnalog.com is a free feature of the Analog Devices website that allows customization of a web page to display only the latest information about products of interest to you. You can choose to receive weekly email notifications containing updates to the web pages that meet your interests, including documentation errata against all documents. MyAnalog.com provides access to books, application notes, data sheets, code examples, and more.

Visit MyAnalog.com to sign up. If you are a registered user, just log on. Your user name is your email address.

REGULATORY COMPLIANCE

The EVAL-SDP-CH1Z is designed to be used solely in a laboratory environment. The board is not intended for use as a consumer end product or as a portion of a consumer end product. The board is an open system design, which does not include a shielded enclosure and therefore may cause interference to other electrical devices in close proximity. This board should not be used in or near any medical equipment or RF devices. Store unused boards in the protective shipping package.

GETTING STARTED

This section provides specific information to assist you with using the SDP-H1 board as part of your evaluation system.

The following topics are covered:

- Package contents
- PC configuration
- USB installation
- Powering up/powering down the SDP

PACKAGE CONTENTS

Your EVAL-SDP-CH1Z board package contains the following:

- EVAL-SDP-CH1Z board
- 1 m USB Standard-A to Mini-B cable
- 12 V 30 W wall wart

Contact the vendor where you purchased your SDP-H1 board or contact Analog Devices if anything is missing.

PC CONFIGURATION

For correct operation of the SDP board, your computer must have the following minimum configuration:

- Windows® XP Service Pack 2 -32 bit, Windows Vista 32-bit/64-bit, or Windows 7 32-bit/64-bit
- USB 2.0 port

When removing the SDP-H1 board from the package, handle the board carefully to avoid the discharge of static electricity, which can damage some components.

USB INSTALLATION

Perform the following tasks to safely install the SDP-H1 board onto the computer. There are two stages in the software application installation procedure. The first stage installs the application software. The second stage installs the .NET Framework 3.5 and the necessary drivers.

Installing the Software

1. Run the application install provided. The first stage installs the applications GUI and the necessary support files onto the computer.
2. Immediately following the application install, the .NET Framework 3.5 and the driver package for the SDP board is installed. If the .NET Framework 3.5 is already preinstalled on the computer in question, this stage is skipped and Step 2 will consist of a driver package installation only.

Connecting the SDP-H1 Board to the PC

Attach the SDP-H1 board to a USB 2.0 port on the computer via the Standard-A to Mini-B cable provided. The SDP-H1 must be powered using the enclosed wall-wart power supply.

Verifying Driver Installation

Before using the SDP-H1 board, verify the driver software has installed properly.

Open the Windows Device Manager and verify the SDP board appears under **ADI Development Tools** as shown in Figure 1.

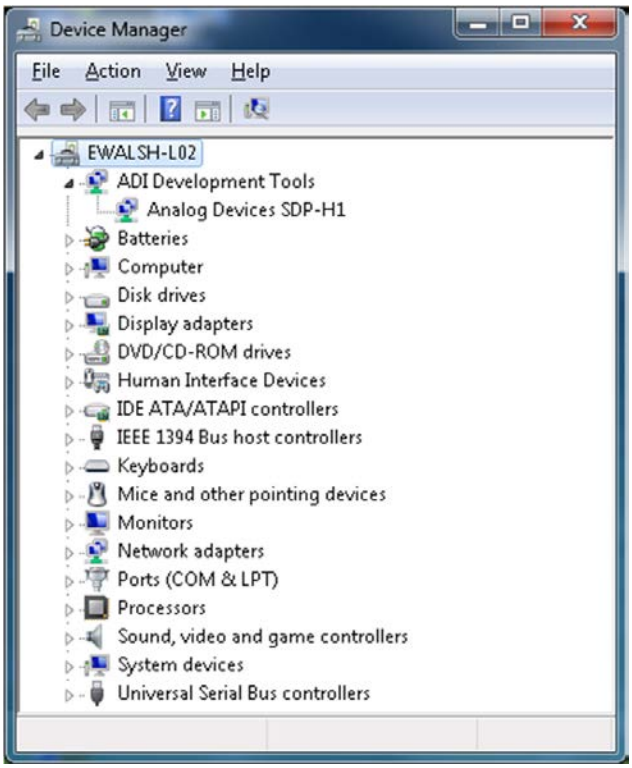

Figure 1. Device Manager

POWERING UP/POWERING DOWN THE SDP

The following sections describe how to safely power up and power down the SDP-H1.

Powering Up the SDP-H1 Board

1. Connect the daughter board to the SDP-H1 board through either the 120-pin mating connector or the FMC connector (whichever is applicable).
2. Power the daughter board. (This may not be required for FMC daughter boards (mezzanine cards). See daughter board documentation for further details.)
3. Power the SDP-H1 board with the enclosed power supply.
4. Connect the USB port on the computer to the SDP-H1 board.

Powering Down the SDP-H1 Board

1. Disconnect the SDP-H1 board power supply.
2. Disconnect any daughter board power supplies.
3. Disconnect the USB port on the computer from the SDP-H1 board.
4. Disconnect the daughter board from the SDP-H1 board.

HARDWARE DESCRIPTION

This section describes the hardware design of the EVAL-SDP-CH1Z board.

The following topics are covered:

- LEDs—This section describes the SDP on-board LEDs.
- Connector Details—This section details the pin assignments on the FMC connector and the 120-pin connector. The SMA connectors are also covered.
- Power—This section lists power requirements of the SDP and identifies connector power inputs and output pins.
- Mechanical specifications—This section provides dimensional information.

LEDS

There are eight LEDs located on the SDP-H1 board (see Figure 2).

FMC_PWR_GD LED

This green LED indicates that the three power supplies supplying power to the FMC connector (12P0V, 3P3V, and VADJ) are turned on.

BF_POWER LED

This green LED indicates that the SDP-H1 Blackfin processor is powered. This is not an indication of USB connectivity between the SDP-H1 and the PC.

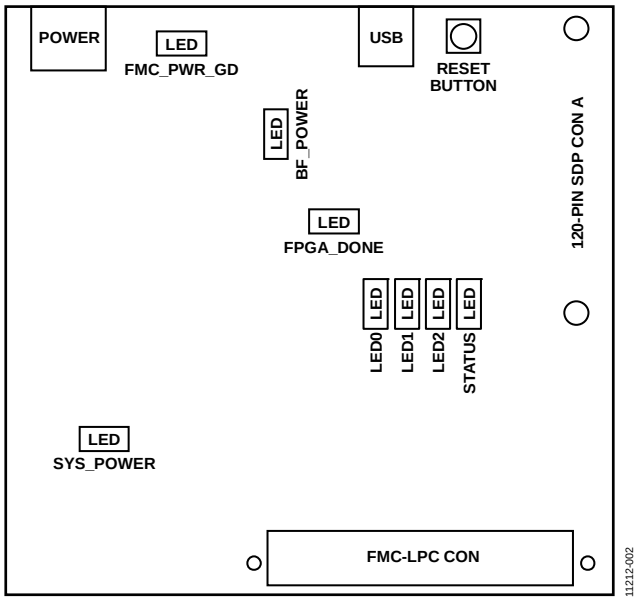

Figure 2. SDP-H1 Board LEDs

FPGA_DONE LED

This green LED indicates whether or not the FPGA has been configured. When it is turned off, the FPGA is unconfigured. When it is turned on, the FPGA is configured. During repeated FPGA configuring, the LED will momentarily turn off until the configuration process has completed.

LED0, LED1, and LED2 LEDs

These red (LED0), orange (LED1), and green (LED2) LEDs are connected to the FPGA and can be used by the user for whatever purpose they see fit.

STATUS LED

The orange status LED is an LED used as a diagnostic tool for evaluation application developers. When there are two or more identical SDP controller board and daughter board combinations connected to the PC simultaneously, the status LED flashes during the connect routine to help the user identify which board they will communicate with.

SYS_POWER LED

This green LED indicates that the power supplies supplying power to the FPGA, DDR2, SRAM, and Blackfin are turned on.

SDP CONNECTOR DETAILS

The SDP-H1 board has a 120-pin SDP connector and a low pin count (LPC) female FMC connector.

This section describes the SDP connector. The FMC-LPC connector is described in the FMC Connector Details section.

The peripherals exposed on the 120-pin SDP connector (a Hirose FX8-120P-SV1(91) 120-pin header connector) are:

- SPI
- SPORT
- I^2C/TWI
- GPIO
- Asynchronous parallel
- PPI
- UART
- Timers

In addition, included on the connector specification are input and output power pins, ground pins, and pins reserved for future use. For further details on the peripheral interfaces, including timing diagrams, see the *ADSP-BF52x Blackfin Processor Hardware Reference*.

Connector Pin Assignments

The connector pin assignments for the SDP connector has been defined independently of the any internal pin sharing that occurs on the Blackfin processor. This pin assignment is identical to that found on the SDP-B (EVAL-SDP-CB1Z) and the SDP-S (EVAL-SDP-CS1Z) boards. Table 1 lists the connector pins and identifies the functionality assigned to each connector pin.

Table 1. 120-Pin SDP Connector Pin Assignments

Pin No.	Pin Name	Description
1	VIN	Power to SDP Board. Requires 300 mA at 5 V.
2	NC	No Connect. Leave this pin unconnected. Do not ground.
3	GND	Connect to ground plane of board.
4	GND	Connect to ground plane of board.
5	USB_VBUS	Connected directly to the USB +5 V supply.
6	GND	Connect to ground plane of board.
7	PAR_D23	Parallel Data Bus Bit 23. (No connect.)[1]
8	PAR_D21	Parallel Data Bus Bit 21. (No connect.)[1]
9	PAR_D19	Parallel Data Bus Bit 19. (No connect.)[1]
10	PAR_D17	Parallel Data Bus Bit 17. (No connect.)[1]
11	GND	Connect to ground plane of board.
12	PAR_D14	Parallel Data Bus Bit 14.
13	PAR_D13	Parallel Data Bus Bit 13.
14	PAR_D11	Parallel Data Bus Bit 11.
15	PAR_D9	Parallel Data Bus Bit 9.
16	PAR_D7	Parallel Data Bus Bit 7.
17	GND	Connect to ground plane of board.
18	PAR_D5	Parallel Data Bus Bit 5.
19	PAR_D3	Parallel Data Bus Bit 3.
20	PAR_D1	Parallel Data Bus Bit 1.
21	$\overline{\text{PAR_RD}}$	Asynchronous Parallel Read Strobe.
22	$\overline{\text{PAR_CS}}$	Asynchronous Parallel Chip Select.
23	GND	Connect to ground plane of board.
24	PAR_A3	Parallel Address Bus Bit 3.
25	PAR_A1	Parallel Address Bus Bit 1.
26	PAR_FS3	Synchronous (PPI) Parallel Frame Sync 3.
27	PAR_FS1	Synchronous (PPI) Parallel Frame Sync 1.
28	GND	Connect to ground plane of board.
29	SPORT0_TDV	SPORT 0 Transmit Data Valid. (No connect.)[1]
30	SPORT1_TDV	SPORT 1 Transmit Data Valid. (No connect.)[1]
31	SPORT_DR1	SPORT Data Receive 1. Secondary SPORT data into processor.
32	SPORT_DT1	SPORT Data Transmit 1. Secondary SPORT data from processor.
33	SPI_D2	SPI 0 Data 2. (No connect.)[1]
34	SPI_D3	SPI 0 Data 3. (No connect.)[1]
35	SPORT_INT	SPORT Interrupt. Used to trigger a non-periodic SPORT event.
36	GND	Connect to ground plane of board.
37	$\overline{\text{SPI_SEL_B}}$	SPI Chip Select B. Use this to control a second device on the SPI bus.
38	$\overline{\text{SPI_SEL_C}}$	SPI Chip Select C. Use this for a third device on the SPI bus.
39	$\overline{\text{SPI_SEL1/SPI_SS}}$	SPI Chip Select 1. Used to connect to SPI boot flash, if required. Also used as chip select when Blackfin processor is operating as SPI slave.
40	GND	Connect to ground plane of board.
41	SDA_1	I^2C Data 1.
42	SCL_1	I^2C Data 1.
43	GPIO0	General-Purpose Input/Output.
44	GPIO2	General-Purpose Input/Output.
45	GPIO4	General-Purpose Input/Output.
46	GND	Connect to ground plane of board.
47	GPIO6	General-Purpose Input/Output.
48	TMR_A	Timer A Flag Pin. Use as first timer, if required.
49	TMR_C	Timer C Flag Pin. (No connect.)[1]
50	NC	No Connect. Leave this pin unconnected. Do not ground.
51	NC	No Connect. Leave this pin unconnected. Do not ground.

Pin No.	Pin Name	Description
52	GND	Connect to ground plane of board.
53	NC	No Connect. Leave this pin unconnected. Do not ground.
54	NC	No Connect. Leave this pin unconnected. Do not ground.
55	NC	No Connect. Leave this pin unconnected. Do not ground.
56	EEPROM_A0	EEPROM A0. Connect to A0 address line of the EEPROM.
57	$\overline{\text{RESET_OUT}}$	Active low reset signal from processor board.
58	GND	Connect to ground plane of board.
59	UART_RX	UART Receive Data.
60	$\overline{\text{RESET_IN}}$	Active low pin to reset controller board.
61	BMODE1	Boot Mode 1. Pull up with 10 kΩ resistor to set SDP to boot from SPI Flash. Enabled on Connector A only.
62	UART_TX	UART Transmit Data.
63	GND	Connect to ground plane of board.
64	$\overline{\text{SLEEP}}$	Active low sleep from processor board.
65	WAKE	External wake up to processor board.
66	NC	No Connect. Leave this pin unconnected. Do not ground.
67	NC	No Connect. Leave this pin unconnected. Do not ground.
68	NC	No Connect. Leave this pin unconnected. Do not ground.
69	GND	Connect to ground plane of board.
70	NC	No Connect. Leave this pin unconnected. Do not ground.
71	CLK_OUT	CLK_OUT from processor.
72	TMR_D	Timer D Flag Pin.
73	TMR_B	Timer B Flag Pin. Use as second timer, if required.
74	GPIO7	General-Purpose Input/Output.
75	GND	Connect to ground plane of board.
76	GPIO5	General-Purpose Input/Output.
77	GPIO3	General-Purpose Input/Output.
78	GPIO1	General-Purpose Input/Output.
79	SCL_0	I^2C Clock 0. Daughter board EEPROM must be connected to this bus.
80	SDA_0	I^2C Data 0. Daughter board EEPROM must be connected to this bus.
81	GND	Connect to ground plane of board.
82	SPI_CLK	SPI Clock.
83	SPI_MISO	SPI Master In, Slave Out Data.
84	SPI_MOSI	SPI Master Out, Slave In Data.
85	$\overline{\text{SPI_SEL_A}}$	SPI Chip Select A. Use this to control the first device on the SPI bus.
86	GND	Connect to ground plane of board.
87	SPORT_TSCLK	SPORT Transmit Clock.
88	SPORT_DT0	SPORT Data Transmit 0. Primary SPORT data from processor.
89	SPORT_TFS	SPORT Transmit Frame Sync.
90	SPORT_RFS	SPORT Receive Frame Sync.
91	SPORT_DR0	SPORT Data Receive 0. Primary SPORT data into processor.
92	SPORT_RSCLK	SPORT Receive Clock.
93	GND	Connect to ground plane of board.
94	PAR_CLK	Clock for Synchronous Parallel Interface (PPI).
95	PAR_FS2	Synchronous (PPI) Parallel Frame Sync 2.
96	PAR_A0	Parallel Address Bus Bit 0.
97	PAR_A2	Parallel Address Bus Bit 2.
98	GND	Connect to ground plane of board.
99	PAR_INT	Parallel Interrupt. Used to trigger a nonperiodic parallel event.
100	$\overline{\text{PAR_WR}}$	Asynchronous Parallel Write Strobe.
101	PAR_D0	Parallel Data Bus Bit 0.
102	PAR_D2	Parallel Data Bus Bit 2.
103	PAR_D4	Parallel Data Bus Bit 4.
104	GND	Connect to ground plane of board.

Pin No.	Pin Name	Description
105	PAR_D6	Parallel Data Bus Bit 6.
106	PAR_D8	Parallel Data Bus Bit 8.
107	PAR_D10	Parallel Data Bus Bit 10.
108	PAR_D12	Parallel Data Bus Bit 12.
109	GND	Connect to ground plane of board.
110	PAR_D15	Parallel Data Bus Bit 15.
111	PAR_D16	Parallel Data Bus Bit 16. (No connect.)[1]
112	PAR_D18	Parallel Data Bus Bit 18. (No connect.)[1]
113	PAR_D20	Parallel Data Bus Bit 20. (No connect.)[1]
114	PAR_D22	Parallel Data Bus Bit 22. (No connect.)[1]
115	GND	Connect to ground plane of board.
116	VIO(+3.3V)	+3.3 V Output. 20 mA maximum current available to power IO voltage on daughter board.
117	GND	Connect to ground plane of board.
118	GND	Connect to ground plane of board.
119	NC	No Connect. Leave this pin unconnected. Do not ground.
120	NC	No Connect. Leave this pin unconnected. Do not ground.

[1] Functionality not implemented on the SDP board.

Each interface provided by the SDP-H1 is available on unique pins of the SDP-H1 120-pin connector. The connector pin numbering scheme is outlined in Figure 3.

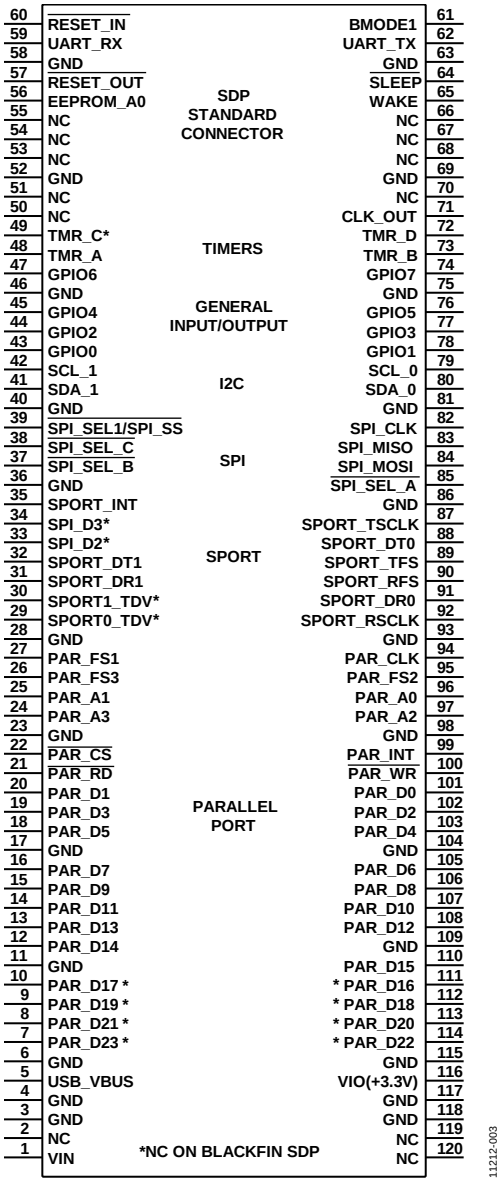

Figure 3. 120-Pin SDP Connector Outline

FMC CONNECTOR DETAILS

This section describes the FMC-LPC connector pin assignments. For further information, see the VITA 57 specification.

Table 2. FMC-LPC Connector Pin Assignments

Pin No.	Pin Name	Description
C1	GND	Ground.
C2	DP0_C2M_P	No connect.
C3	DP0_C2M_N	No connect.
C4	GND	Ground.
C5	GND	Ground.
C6	DP0_M2C_P	No connect.
C7	DP0_M2C_N	No connect.
C8	GND	Ground.
C9	GND	Ground.
C10	LA06_P	User-defined signals connected to FPGA Bank 2.[1]
C11	LA06_N	User-defined signals connected to FPGA Bank 2.[1]
C12	GND	Ground.
C13	GND	Ground.
C14	LA10_P	User-defined signals connected to FPGA Bank 2.[1]
C15	LA10_N	User-defined signals connected to FPGA Bank 2.[1]
C16	GND	Ground.
C17	GND	Ground.
C18	LA14_P	User-defined signals connected to FPGA Bank 2.[1]
C19	LA14_N	User-defined signals connected to FPGA Bank 2.[1]
C20	GND	Ground.
C21	GND	Ground.
C22	LA18_P_CC	User-defined signals connected to FPGA Bank 2.[1]
C23	LA18_N_CC	User-defined signals connected to FPGA Bank 2.[1]
C24	GND	Ground.
C25	GND	Ground.
C26	LA27_P	User-defined signals connected to FPGA Bank 2.[1]
C27	LA27_N	User-defined signals connected to FPGA Bank 2.[1]
C28	GND	Ground.
C29	GND	Ground.
C30	SCL	I^2C clock line for reading FMC EEPROM.
C31	SDA	I^2C data line for reading FMC EEPROM.
C32	GND	Ground.
C33	GND	Ground.
C34	GA0	I^2C geographical address 0. Must be connected to Address Pin A1 of FMC EEPROM.
C35	12P0V	12 V (1 A) power supply to daughter board.
C36	GND	Ground.
C37	12P0V	12 V (1 A) power supply to daughter board.
C38	GND	Ground.
C39	3P3V	3.3 V (3 A) power supply to daughter board.
C40	GND	Ground.
D1	PG_C2M	Active high signal indicating 12P0V, 3P3V, and VADJ power supplies are turned on.
D2	GND	Ground.
D3	GND	Ground.
D4	No connect	No connect.
D5	No connect	No connect.
D6	GND	Ground.
D7	GND	Ground.
D8	LA01_P_CC	User-defined signals connected to FPGA Bank 2.[1, 2]
D9	LA01_N_CC	User-defined signals connected to FPGA Bank 2.[1, 2]

Pin No.	Pin Name	Description
D10	GND	Ground.
D11	LA05_P	User-defined signals connected to FPGA Bank 2.[1]
D12	LA05_N	User-defined signals connected to FPGA Bank 2.[1]
D13	GND	Ground.
D14	LA09_P	User-defined signals connected to FPGA Bank 2.[1]
D15	LA09_N	User-defined signals connected to FPGA Bank 2.[1]
D16	GND	Ground.
D17	LA13_P	User-defined signals connected to FPGA Bank 2.[1]
D18	LA13_N	User-defined signals connected to FPGA Bank 2.[1]
D19	GND	Ground.
D20	LA17_P_CC	User-defined signals connected to FPGA Bank 2.[1, 2]
D21	LA17_N_CC	User-defined signals connected to FPGA Bank 2.[1, 2]
D22	GND	Ground.
D23	LA23_P	User-defined signals connected to FPGA Bank 2.[1]
D24	LA23_N	User-defined signals connected to FPGA Bank 2.[1]
D25	GND	Ground
D26	LA26_P	User-defined signals connected to FPGA Bank 2.[1]
D27	LA26_N	User-defined signals connected to FPGA Bank 2.[1]
D28	GND	Ground.
D29	TCK	JTAG clock.
D30	TDI	JTAG data input.
D31	TDO	JTAG data output.
D32	3P3VAUX	3.3 V (20 mA) power supply for powering only the FMC EEPROM.
D33	TMS	JTAG mode select.
D34	TRST_L	JTAG reset.
D35	GA1	I2C geographical Address 1. Must be connected to address pin A0 of FMC EEPROM.
D36	3P3V	3.3 V (3 A) power supply to daughter board.
D37	GND	Ground.
D38	3P3V	3.3 V (3 A) power supply to daughter board.
D39	GND	Ground.
D40	3P3V	3.3 V (3 A) power supply to daughter board.
G1	GND	Ground.
G2	CLK1_M2C_P	Positive line of differential pair for carrying clock signals from daughter board.
G3	CLK1_M2C_N	Negative line of differential pair for carrying clock signals from daughter board.
G4	GND	Ground.
G5	GND	Ground.
G6	LA00_P_CC	User-defined signals connected to FPGA Bank 2.[1, 2]
G7	LA00_N_CC	User-defined signals connected to FPGA Bank 2.[1, 2]
G8	GND	Ground.
G9	LA03_P	User-defined signals connected to FPGA Bank 2.[1]
G10	LA03_N	User-defined signals connected to FPGA Bank 2.[1]
G11	GND	Ground.
G12	LA08_P	User-defined signals connected to FPGA Bank 2.[1]
G13	LA08_N	User-defined signals connected to FPGA Bank 2.[1]
G14	GND	Ground.
G15	LA12_P	User-defined signals connected to FPGA Bank 2.[1]
G16	LA12_N	User-defined signals connected to FPGA Bank 2.[1]
G17	GND	Ground.
G18	LA16_P	User-defined signals connected to FPGA Bank 2.[1]
G19	LA16_N	User-defined signals connected to FPGA Bank 2.[1]
G20	GND	Ground.
G21	LA20_P	User-defined signals connected to FPGA Bank 2.[1]
G22	LA20_N	User-defined signals connected to FPGA Bank 2.[1]

Pin No.	Pin Name	Description
G23	GND	Ground.
G24	LA22_P	User-defined signals connected to FPGA Bank 2.[1]
G25	LA22_N	User-defined signals connected to FPGA Bank 2.[1]
G26	GND	Ground.
G27	LA25_P	User-defined signals connected to FPGA Bank 2.[1]
G28	LA25_N	User-defined signals connected to FPGA Bank 2.[1]
G29	GND	Ground.
G30	LA29_P	User-defined signals connected to FPGA Bank 2.[1]
G31	LA29_N	User-defined signals connected to FPGA Bank 2.[1]
G32	GND	Ground.
G33	LA31_P	User-defined signals connected to FPGA Bank 2.[1]
G34	LA31_N	User-defined signals connected to FPGA Bank 2.[1]
G35	GND	Ground.
G36	LA33_P	User-defined signals connected to FPGA Bank 2.[1]
G37	LA33_N	User-defined signals connected to FPGA Bank 2.[1]
G38	GND	Ground.
G39	VADJ	Variable (1.2 V to 3.3 V) (2 A) power supply to daughter board.
G40	GND	Ground.
H1	No connect	No connect.
H2	PRSNT_M2C_L	Indicates presence of daughter board. Must be tied to ground on daughter board.
H3	GND	Ground.
H4	CLK0_M2C_P	Positive line of differential pair for carrying clock signals from daughter board.
H5	CLK0_M2C_N	Negative line of differential pair for carrying clock signals from daughter board.
H6	GND	Ground.
H7	LA02_P	User defined signals connected to FPGA Bank 2.[1]
H8	LA02_N	User defined signals connected to FPGA Bank 2.[1]
H9	GND	Ground.
H10	LA04_P	User defined signals connected to FPGA Bank 2.[1]
H11	LA04_N	User defined signals connected to FPGA Bank 2.[1]
H12	GND	Ground.
H13	LA07_P	User-defined signals connected to FPGA Bank 2.[1]
H14	LA07_N	User-defined signals connected to FPGA Bank 2.[1]
H15	GND	Ground.
H16	LA11_P	User-defined signals connected to FPGA Bank 2.[1]
H17	LA11_N	User-defined signals connected to FPGA Bank 2.[1]
H18	GND	Ground.
H19	LA15_P	User-defined signals connected to FPGA Bank 2.[1]
H20	LA15_N	User-defined signals connected to FPGA Bank 2.[1]
H21	GND	Ground.
H22	LA19_P	User-defined signals connected to FPGA Bank 2.[1]
H23	LA19_N	User-defined signals connected to FPGA Bank 2.[1]
H24	GND	Ground.
H25	LA21_P	User-defined signals connected to FPGA Bank 2.[1]
H26	LA21_N	User-defined signals connected to FPGA Bank 2.[1]
H27	GND	Ground.
H28	LA24_P	User-defined signals connected to FPGA Bank 2.[1]
H29	LA24_N	User-defined signals connected to FPGA Bank 2.[1]
H30	GND	Ground.
H31	LA28_P	User-defined signals connected to FPGA Bank 2.[1]
H32	LA28_N	User-defined signals connected to FPGA Bank 2.[1]
H33	GND	Ground.
H34	LA30_P	User-defined signals connected to FPGA bank 2.[1]
H35	LA30_N	User-defined signals connected to FPGA Bank 2.[1]

Pin No.	Pin Name	Description
H36	GND	Ground.
H37	LA32_P	User-defined signals connected to FPGA Bank 2.[1]
H38	LA32_N	User-defined signals connected to FPGA Bank 2.[1]
H39	GND	Ground.
H40	VADJ	Variable (1.2 V to 3.3 V) (2 A) power supply to daughter board.

[1] User-defined signals with P suffix can be used as the positive pin of the differential pair. User defined signals with N suffix can be used as the negative pin of the differential pair. For further information, see the VITA 57 specification.
[2] User-defined signals with CC suffix are the preferred signal lines on which to transmit clock signals from the controller board to the daughter board. They are connected to global clock lines on the FPGA but they can also be used to carry any other user-defined signal. For further information, see the VITA 57 specification.

Table 3. FMC Connector Outline

	H	G	D	C
1	No connect	GND	PG_C2M	GND
2	PRSNT_M2C_L	CLK1_M2C_P	GND	No connect
3	GND	CLK1_M2C_N	GND	No connect
4	CLK0_M2C_P	GND	No connect	GND
5	CLK0_M2C_N	GND	No connect	GND
6	GND	LA00_P_CC	GND	No connect
7	LA02_P	LA00_N_CC	GND	No connect
8	LA02_N	GND	LA01_P_CC	GND
9	GND	LA03_P	LA01_N_CC	GND
10	LA04_P	LA03_N	GND	LA06_P
11	LA04_N	GND	LA05_P	LA06_N
12	GND	LA08_P	LA05_N	GND
13	LA07_P	LA08_N	GND	GND
14	LA07_N	GND	LA09_P	LA10_P
15	GND	LA12_P	LA09_N	LA10_N
16	LA11_P	LA12_N	GND	GND
17	LA11_N	GND	LA13_P	GND
18	GND	LA16_P	LA13_N	LA14_P
19	LA15_P	LA16_N	GND	LA14_N
20	LA15_N	GND	LA17_P_CC	GND
21	GND	LA20_P	LA17_N_CC	GND
22	LA19_P	LA20_N	GND	LA18_P_CC
23	LA19_N	GND	LA23_P	LA18_N_CC
24	GND	LA22_P	LA23_N	GND
25	LA21_P	LA22_N	GND	GND
26	LA21_N	GND	LA26_P	LA27_P
27	GND	LA25_P	LA26_N	LA27_N
28	LA24_P	LA25_N	GND	GND
29	LA24_N	GND	TCK	GND
30	GND	LA29_P	TDI	SCL
31	LA28_P	LA29_N	TDO	SDA
32	LA28_N	GND	3P3VAUX	GND
33	GND	LA31_P	TMS	GND
34	LA30_P	LA31_N	TRST_L	GA0
35	LA30_N	GND	GA1	12P0V
36	GND	LA33_P	3P3V	GND
37	LA32_P	LA33_N	GND	12P0V
38	LA32_N	GND	3P3V	GND
39	GND	VADJ	GND	3P3V
40	VADJ	GND	3P3V	GND

SMA CONNECTORS

The SDP-H1 has the PCB footprints for four SMA connectors (Emerson 142-0701-801, Digi-Key J502-ND). J701 and J702 are, respectively, the positive and the negative of a differential pair for supplying an external clock source to the FPGA and they are connected to clock capable pins on the FPGA. J703 and J704 can be used to supply an external trigger to the FPGA but they are not connected to clock capable FPGA pins. J701, J702, J703, and J704 are connected to an FPGA bank supplied by a fixed 3.3 V supply.

POWER

The SDP-H1 must be powered using the enclosed 12 V 30 W wall-wart power supply. This 12 V supply is converted, using on-board dc-to-dc switching regulators, to power all on-board systems as well as supply power to any daughter board connected to the FMC connector. Table 4 outlines the voltage and currents available to daughter boards connected to the FMC connector (as required by the VITA 57 specification). Note that the maximum allowed power budget for the daughter board is 10 W (for further information, see the VITA 57 specification).

Table 4. FMC Connector Power Supply Capabilities

Voltage Supply	Voltage Range	Number Of Pins	Maximum Current	Tolerance
VADJ	1.2 V to 3.3 V	2	2 A	±5%
3P3VAUX	3.3 V	1	20 mA	±5%
3P3V	3.3 V	4	3 A	±5%
12P0V	12 V	2	1 A	±5%

The SDP-H1 board also provides 3.3 V at 20 mA on Pin 116 (VIO_+3.3V) to connected daughter boards as the VIO voltage for the daughter board. Pin 5 (USB_VBUS) is connected to an internal 5 V power supply, providing 5 V ±10% as an output of the SDP board.

MECHANICAL SPECIFICATIONS

The mechanical specifications of the SDP-H1 board are 4.33" × 4.17" (110 mm × 106 mm). The height of the 120-pin connectors from the bottom of the board is approximately 0.152" (3.86 mm). The height of the FMC-LPC connector from the top of the board is approximately 0.258" (6.55 mm). The tallest component on the top is the dc power input connector at approximately 0.433" (11 mm) and the tallest component on the bottom is the L9 inductor at approximately 0.157" (4 mm). (The rubber feet on the bottom of the board are 0.311" (7.9 mm) tall.) Refer to Figure 4.

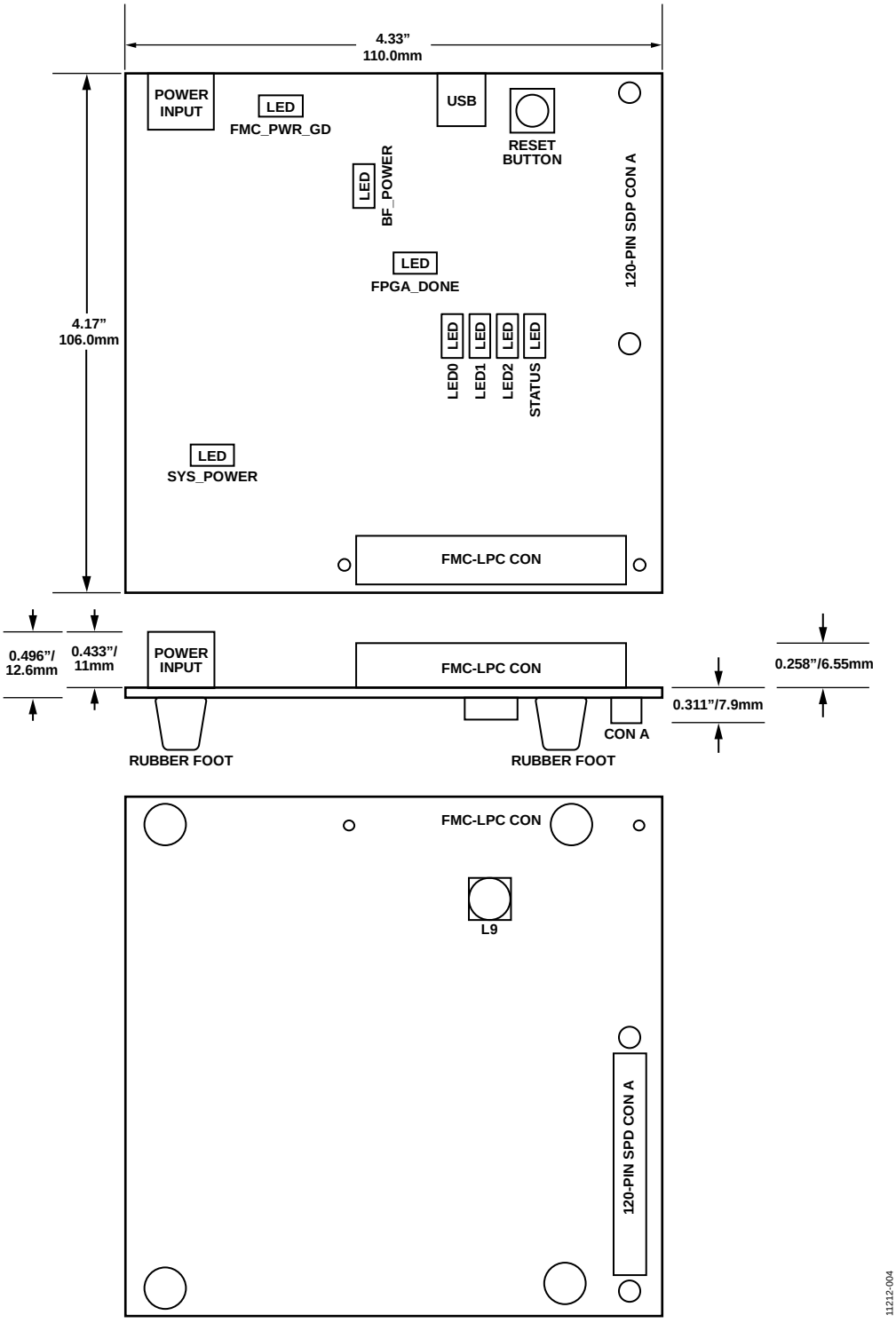

Figure 4. SDP-H1 Board Mechanical Specifications

SCHEMATICS

This section provides the schematic drawings for the EVAL-SDP-CH1Z board. The schematic pages include:

- SDP-H1—Blackfin Power
- SDP-H1—Blackfin Memory
- SDP-H1—Blackfin Clocks_USB
- SDP-H1—Blackfin I/O
- SDP-H1—Blackfin Connector A
- SDP-H1—FPGA Bank 0-Blackfin
- SDP-H1—FPGA Bank 1-SRAM
- SDP-H1—FPGA Bank 2-FMC
- SDP-H1—FPGA Bank 3-SDRAM
- SDP-H1—FPGA Power
- SDP-H1—Power Supply Part 1
- SDP-H1—Power Supply Part 2
- SDP-H1—Power Supply Part 3

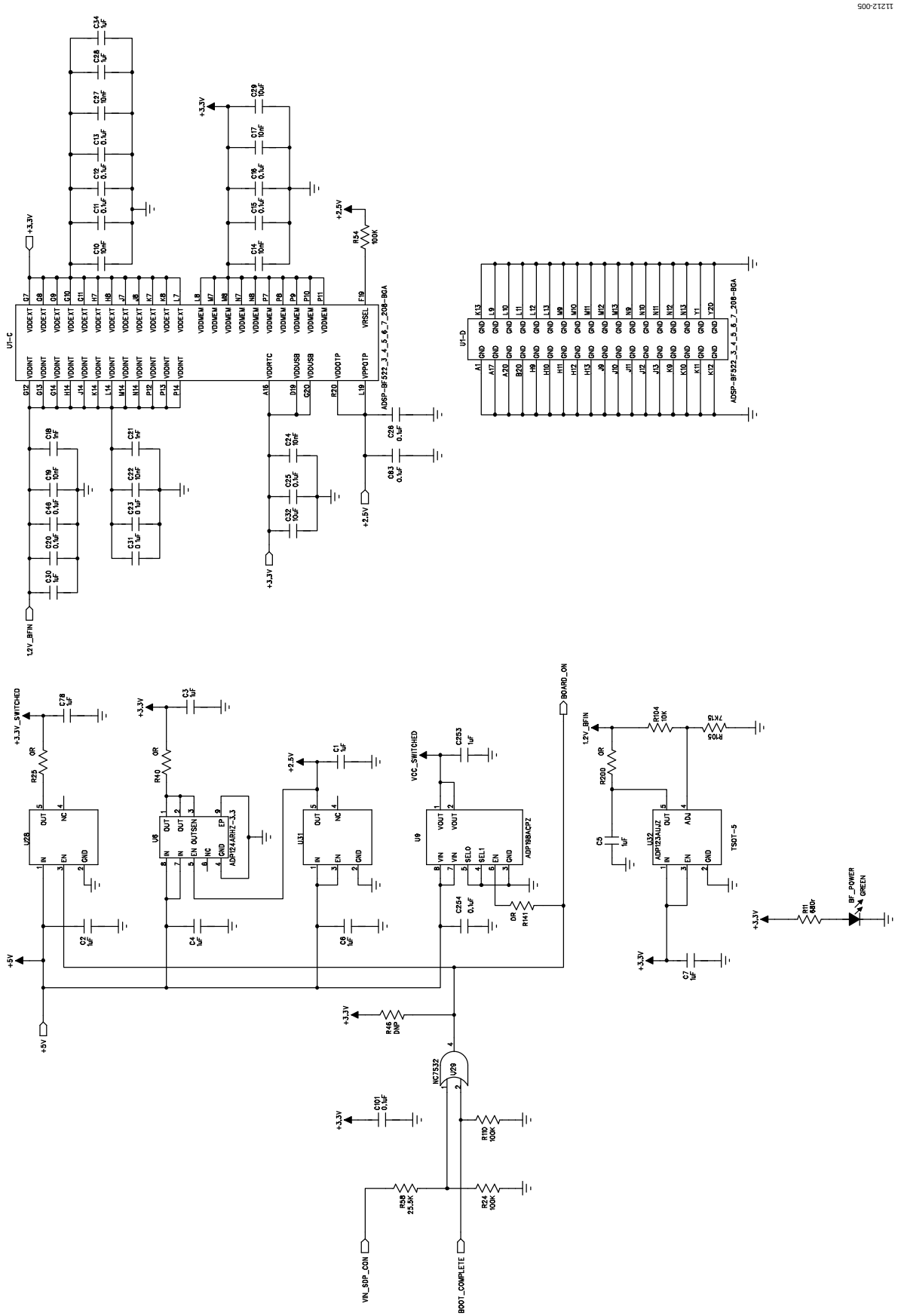

Figure 5. SDP-H1—Blackfin Power

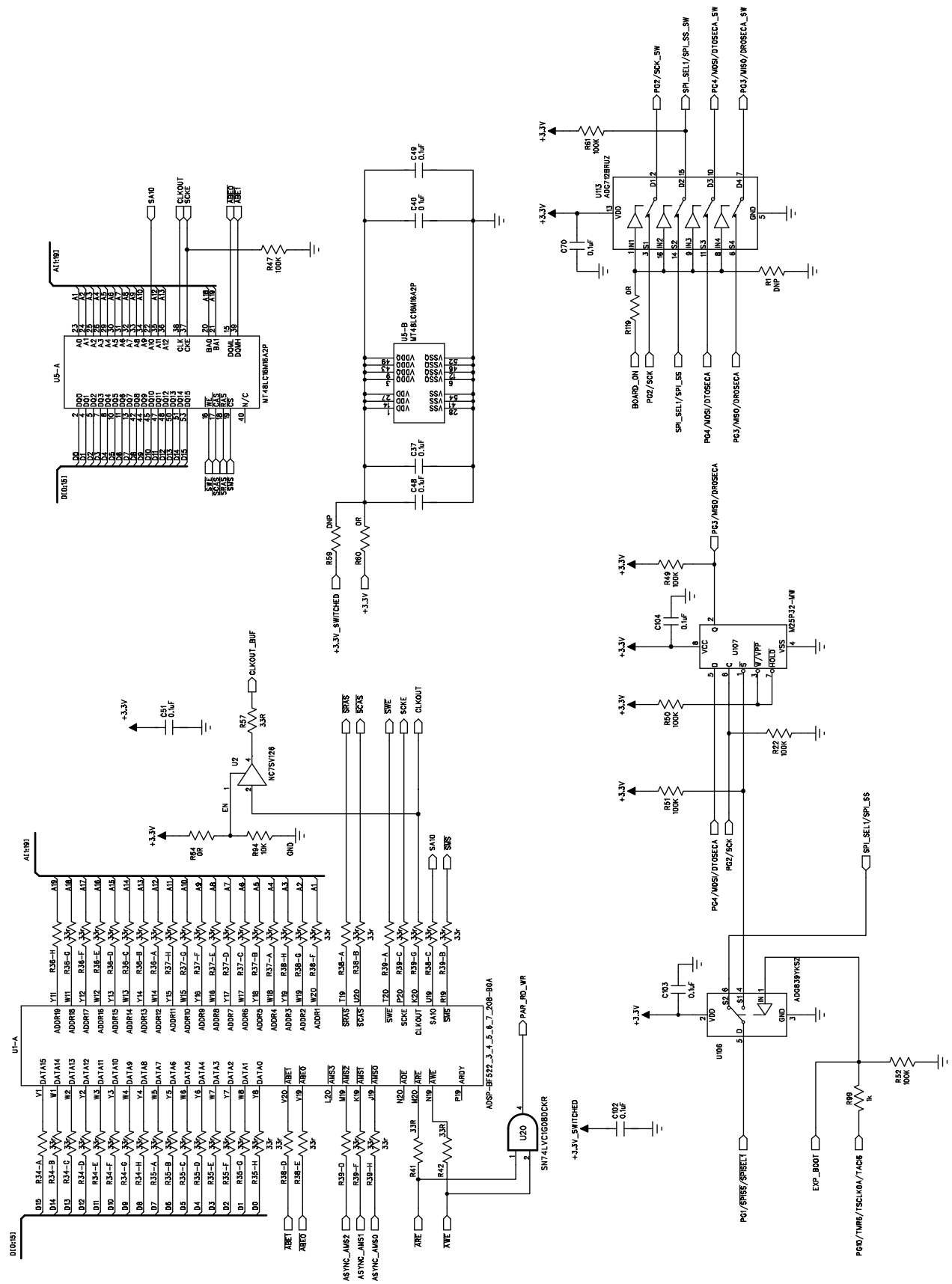

Figure 6. SDP-H1—Blackfin Memory

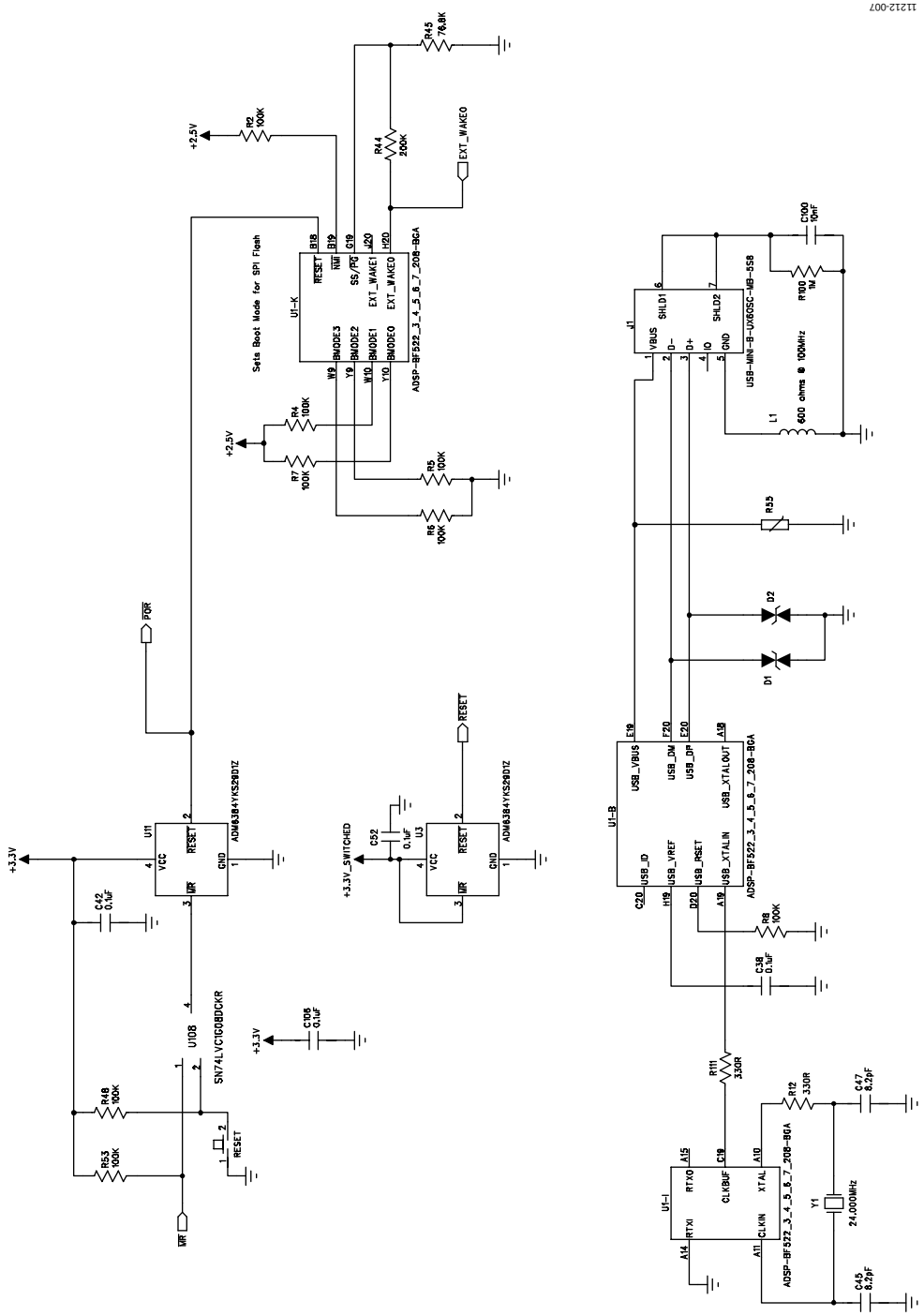

Figure 7. SDP-H1—Blackfin Clocks_USB

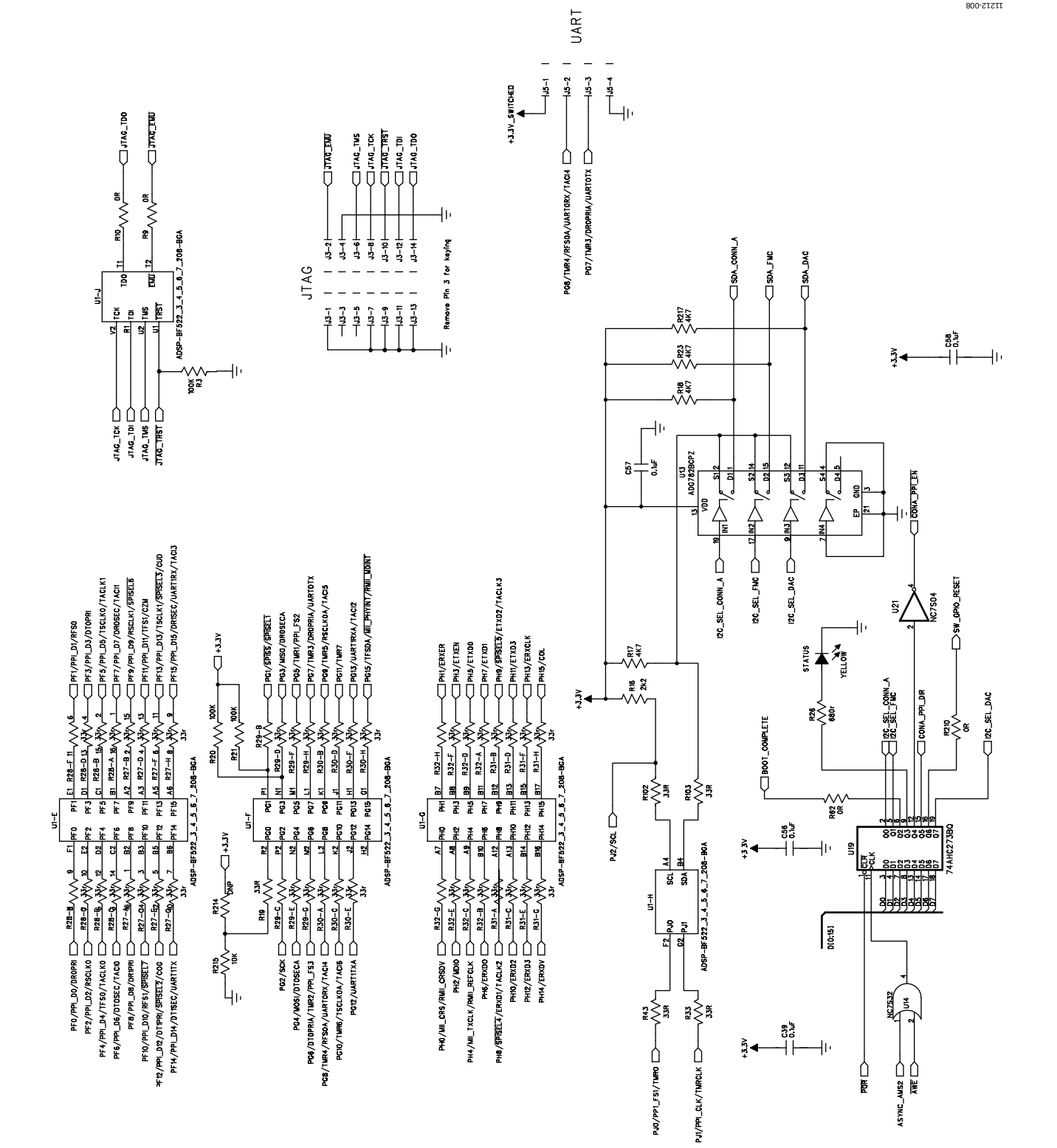

Figure 8. SDP-H1—Blackfin I/O

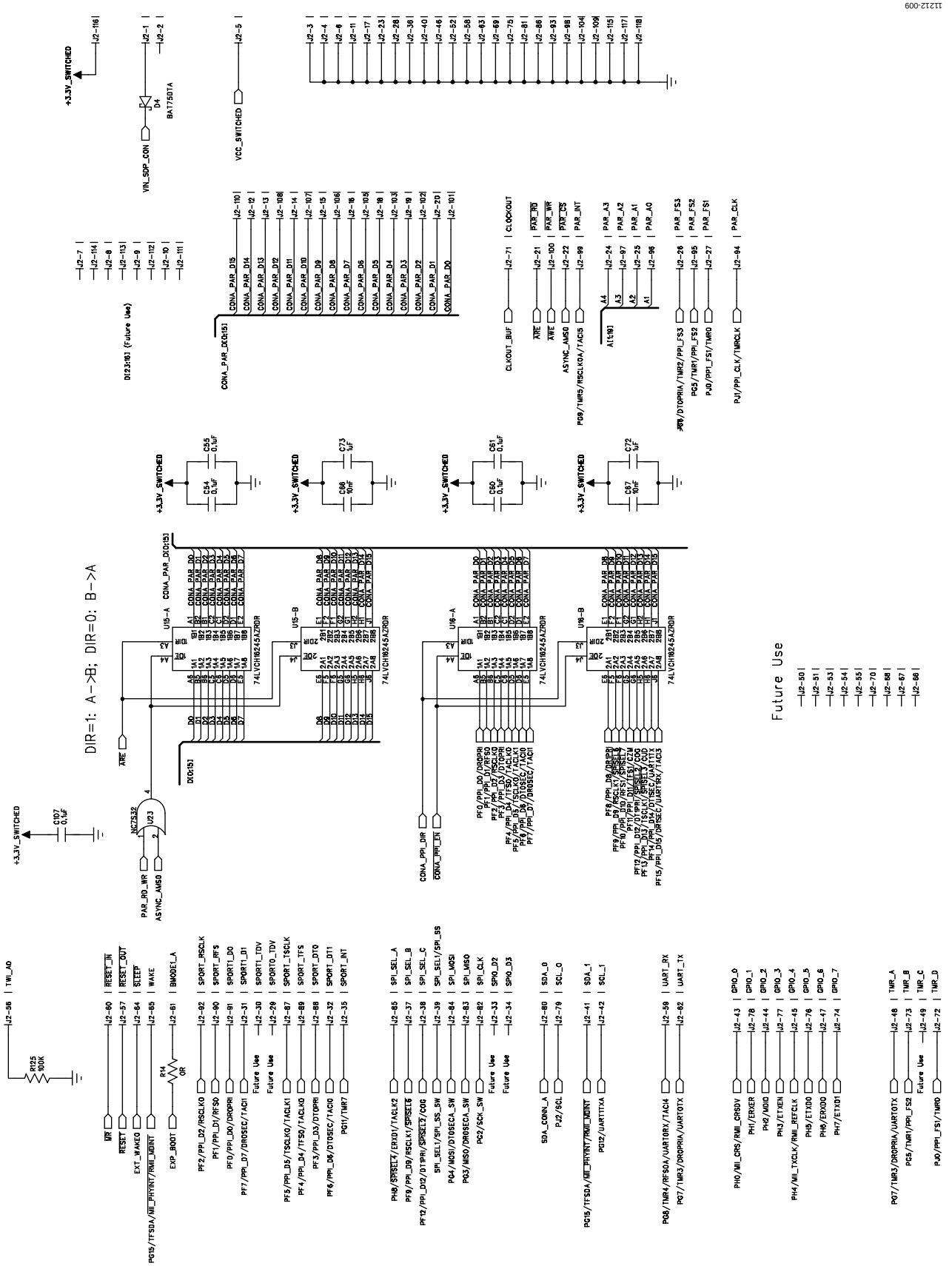

Figure 9. SDP-H1—Blackfin Connector A

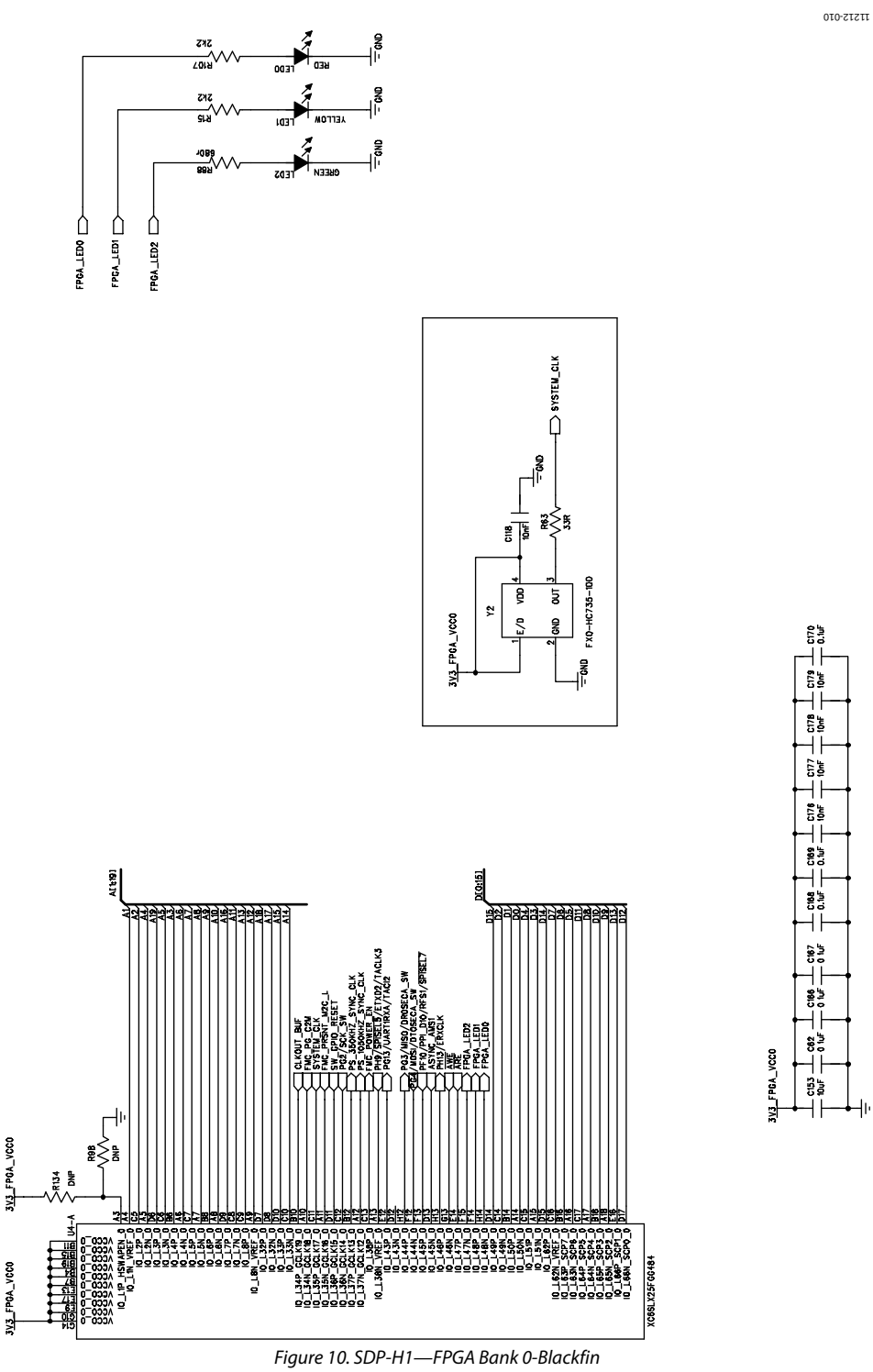

Figure 10. SDP-H1—FPGA Bank 0-Blackfin

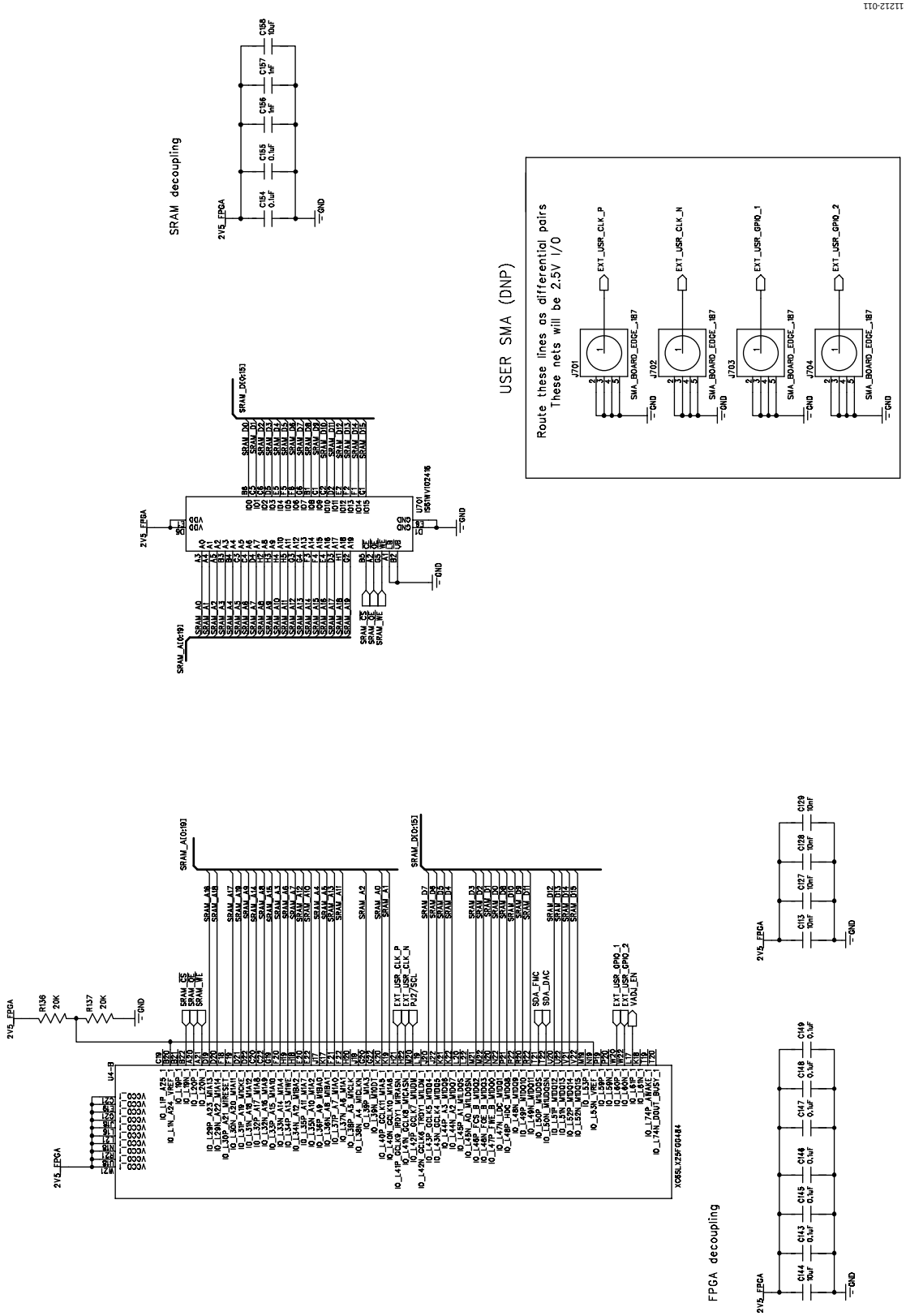

Figure 11. SDP-H1—FPGA Bank 1-SRAM

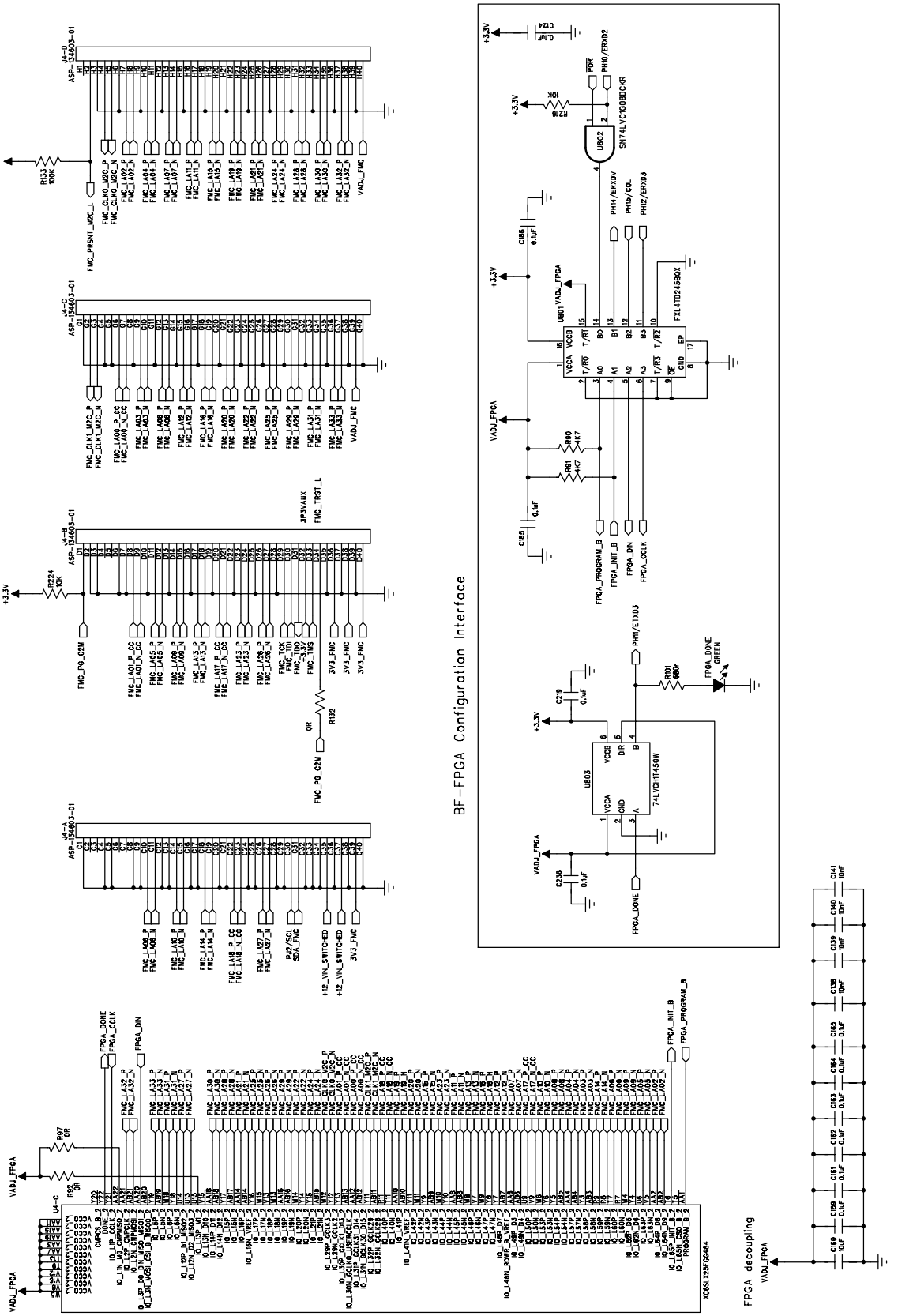

Figure 12. SDP-H1—FPGA Bank 2-FMC

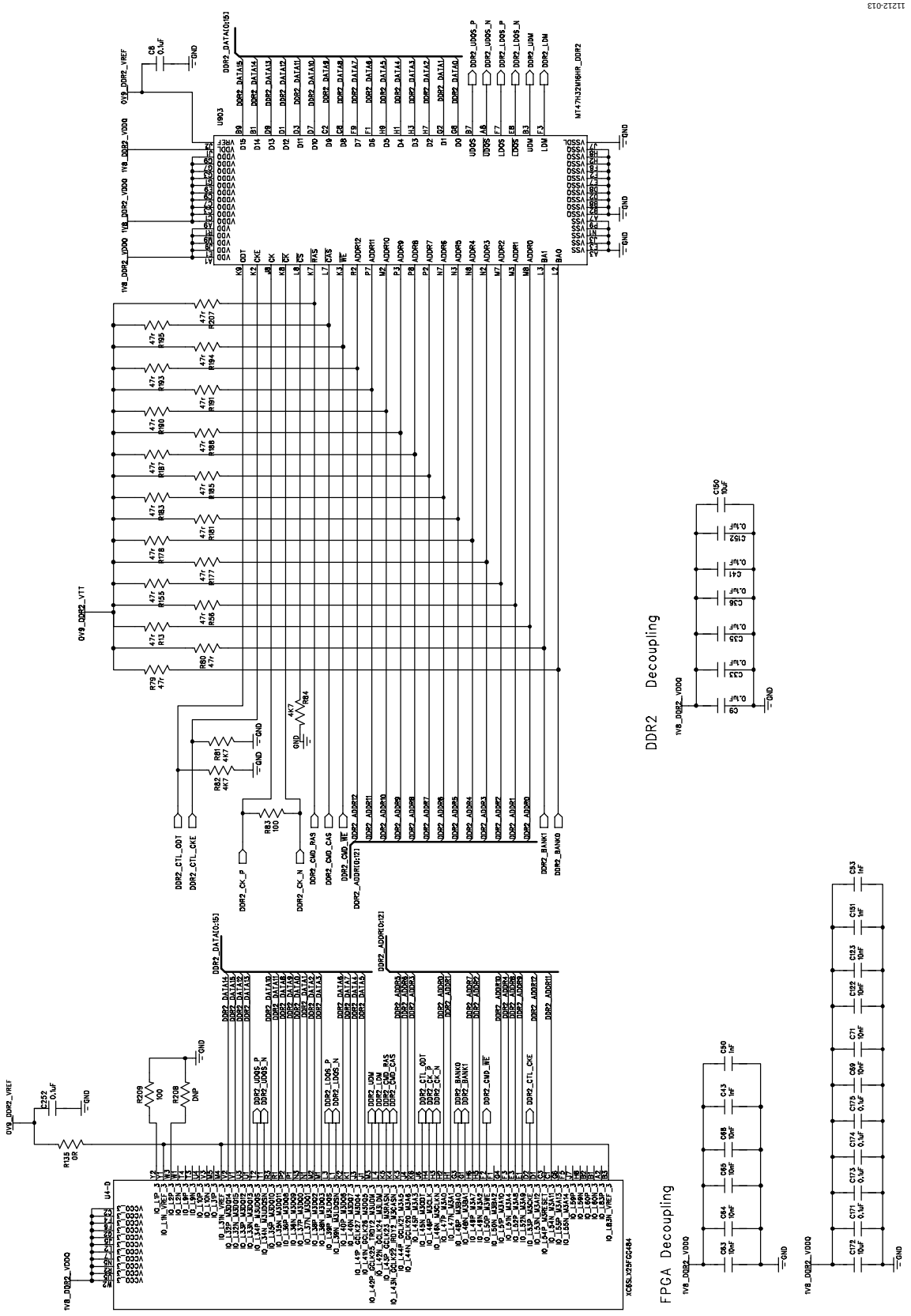

Figure 13. SDP-H1—FPGA Bank 3-SDRAM

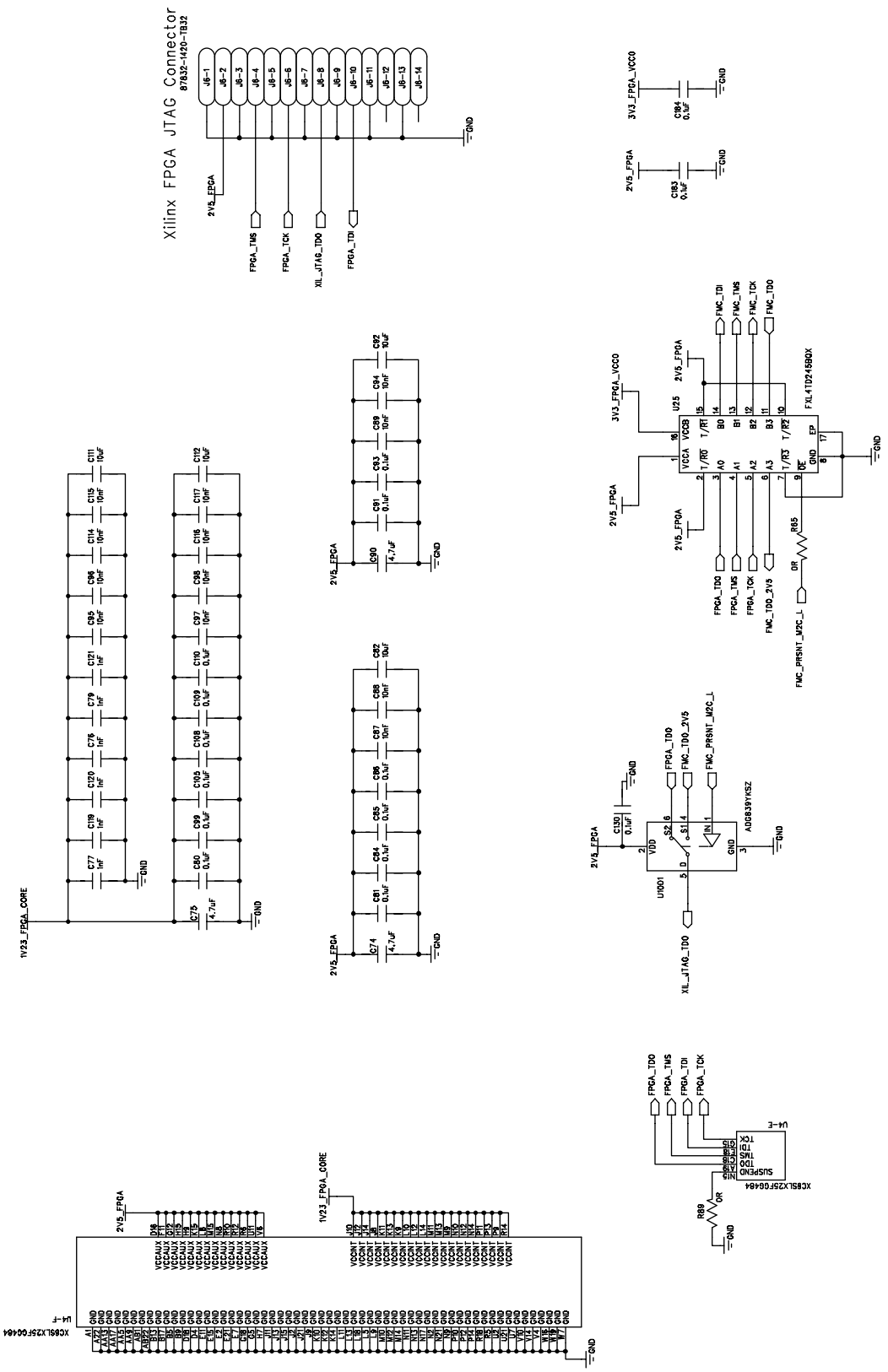

Figure 14. SDP-H1—FPGA Power

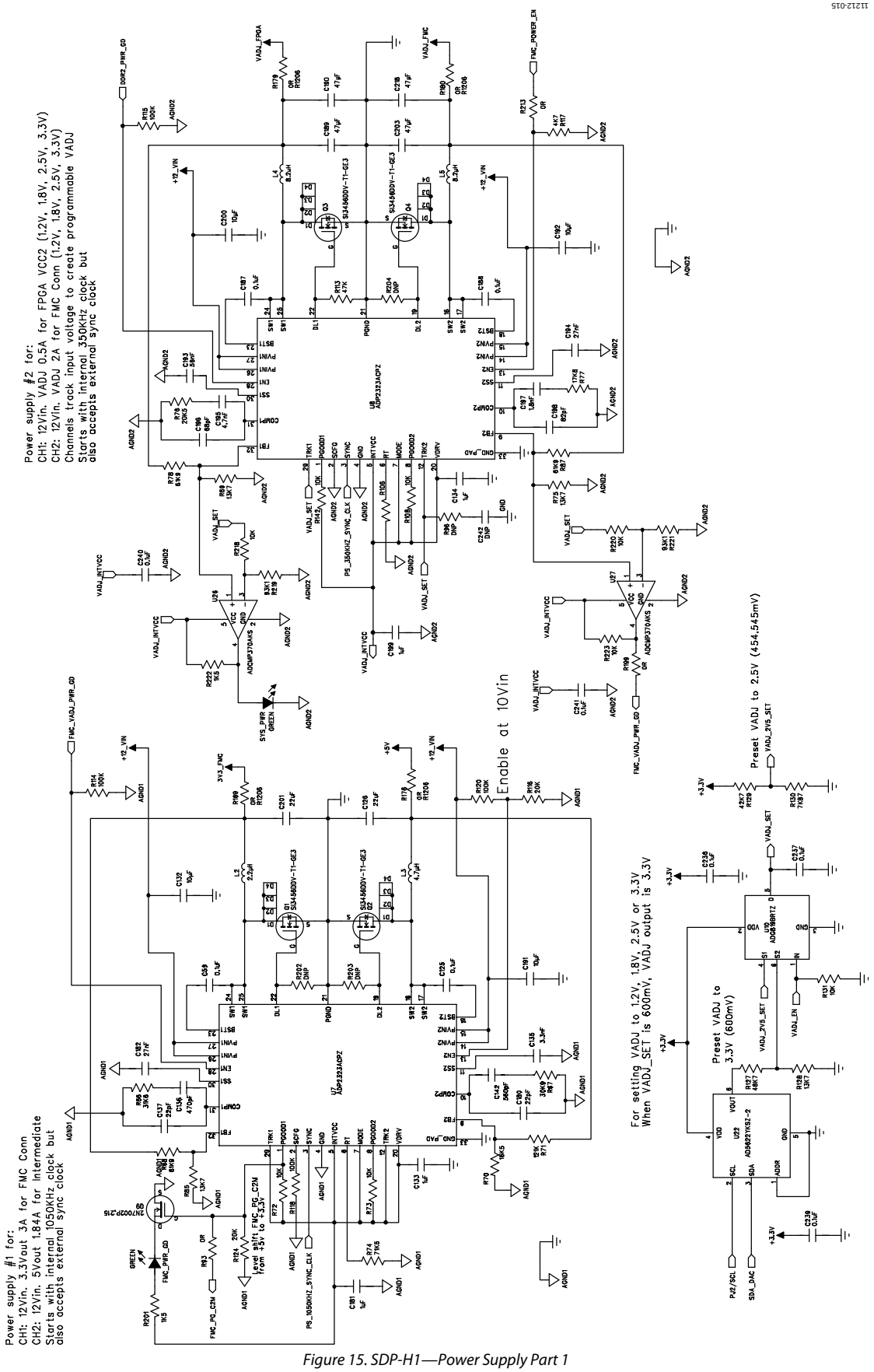

Figure 15. SDP-H1—Power Supply Part 1

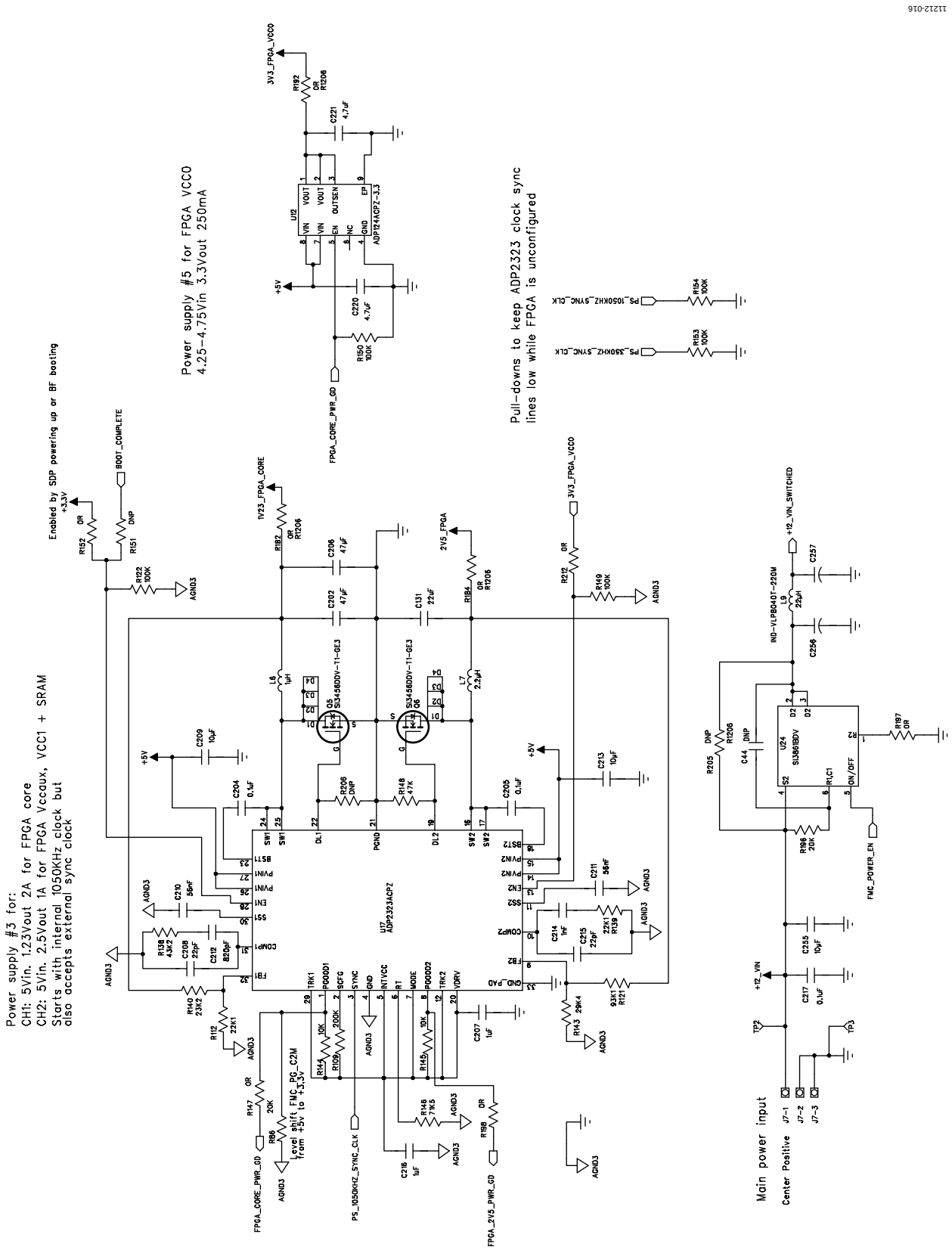

Figure 16. SDP-H1—Power Supply Part 2

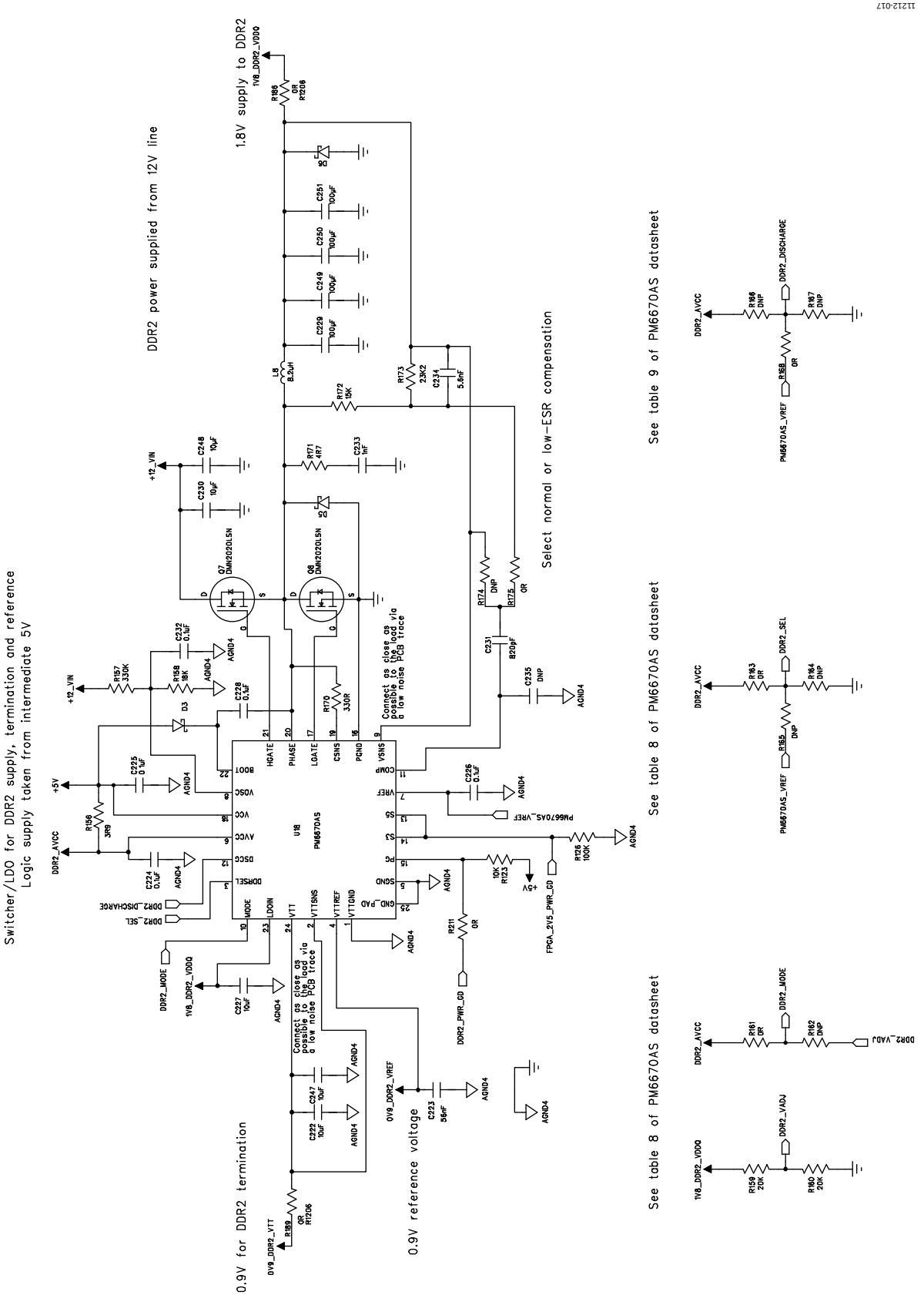

Figure 17. SDP-H1—Power Supply Part 3

NOTES

NOTES

ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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