System Demonstration Platform Eases Transition from Evaluation to Prototyping

By Rosemary Ryan

Introduction

To simplify the process of selecting components for new designs, Analog Devices provides design engineers with *evaluation boards* and *application software*. After the initial evaluation has been completed, a few aspects of the design typically require further investigation. How will the component hook up to the system's FPGA, microcontroller, or digital signal processor (DSP)? Can the interface and application code be verified before finalizing the system design? Can HDL coding be started while waiting for a printed circuit board to arrive? The best way to save time and increase the chance of success is to have the code and interface ready before the board is built. While the *System Demonstration Platform* (SDP) from Analog Devices is primarily an evaluation tool, it was designed to allow this type of prototyping, making it simpler than ever to kick start system development.

System Demonstration Platform

The low cost, reusable SDP evaluation platform, shown in Figure 1, was designed with versatility in mind. Comprising *controller boards*, *interposer boards*, and *daughter evaluation boards*, the platform facilitates quick, easy movement from evaluation to prototyping.

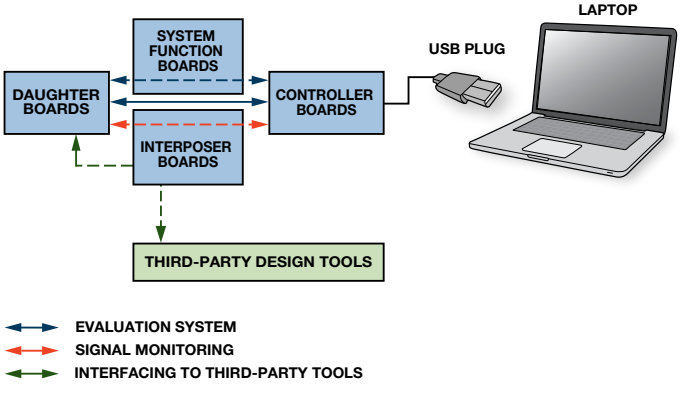

Figure 1. System demonstration platform overview.

The two-board evaluation system includes a controller board that can be reused with multiple daughter boards. The controller board connects to a personal computer over USB 2.0 and provides the daughter board with a series of commonly used communication interfaces through a standard 120-pin connector. Over 180 compatible boards for *product evaluation* and *reference circuit evaluation* are available, all with the same 120-pin connector, which also connects to the input and output signals of the component being evaluated. The full range of product evaluation boards includes those for ADCs, DACs, DDS, RF PLLs, and MEMS microphones. Reference circuit evaluation boards are available for all applications in which ADI components are used, including automotive, healthcare, process control, and industrial automation. Figure 2 shows the SDP-B controller board connected to a PulSAR® ADC evaluation board. A complete list of available boards can be found at www.analog.com/sdp.

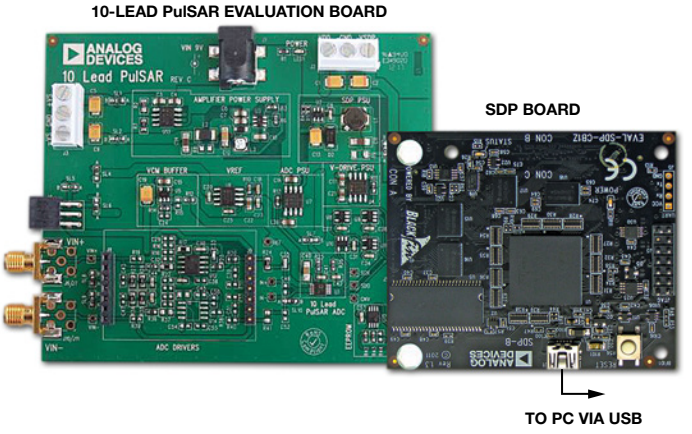

Figure 2. Evaluation hardware setup with the SDP-B and a PulSAR ADC evaluation board.

The platform also includes a series of interposer boards that allow the wide range of daughter boards to connect directly to third-party evaluation tools, such as Xilinx® FPGA evaluation boards or the BeMicro Software Development Kit (SDK). These interposer boards, which connect the inputs and outputs of the component on the ADI evaluation board to a Xilinx or Altera® FPGA, are the key that enables quick, easy prototyping with ADI evaluation boards and third-party tools.

120-Pin Connector

The 120-pin connector uses the same standard, well-defined pinout as ADI's DSP EZ-KIT Lite.® The connector includes SPI, I^2C, SPORT, GPIO, timers, and parallel interfaces, plus power and ground pins. The connector supports 3.3-V logic levels.

Interposer Boards

Interposer boards connect to a daughter board through the standard 120-pin connector. They then route the signals from the 120-pin connector to a second connector, allowing the user to connect the daughter board to their choice of FPGA evaluation board. Interposer boards, which do not include any additional logic or signal conditioning, simply route signals from the SDP connector to the second connector—the VITA 57 standard FMC connector, for example. Three interposer boards are available, including the SDP-I-FMC interposer, BeMicro SDK/SDP interposer, and SDP breakout board.

SDP-I-FMC Interposer

The SDP-I-FMC interposer, shown in Figure 3, connects any SDP-compatible evaluation board to a Xilinx FPGA evaluation board that supports 3.3-V I/O. It includes the standard 120-pin connector and a low-pin-count (LPC) FMC connector, which is part of the industry-standard VITA 57 specification that outlines I/O connectivity to FPGAs. The 120-pin connector on the daughter board connects to the 120-pin receptacle on the SDP-I-FMC interposer. The FMC connector on the SDP-I-FMC interposer then connects to the FMC connector of the Xilinx evaluation board.

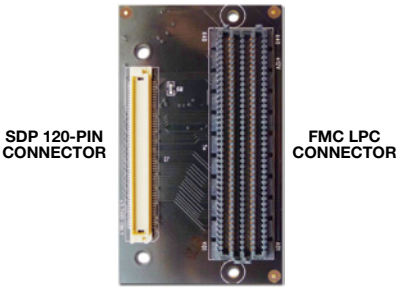

Figure 3. SDP-I-FMC interposer.

The Kintex KC705 is an example of a Xilinx evaluation board that has 3.3-V I/O and the FMC connector. Therefore, it can connect to an ADI evaluation board through the SDP-I-FMC, as shown in Figure 4. Example code for a large number of SDP-compatible evaluation boards is available on the ADI wiki site, allowing users to start their FPGA development as early as possible. Further details on the SDP-I-FMC, including a schematic and ordering information, can be found at www.analog.com/sdpFMC. The board retails for $49.

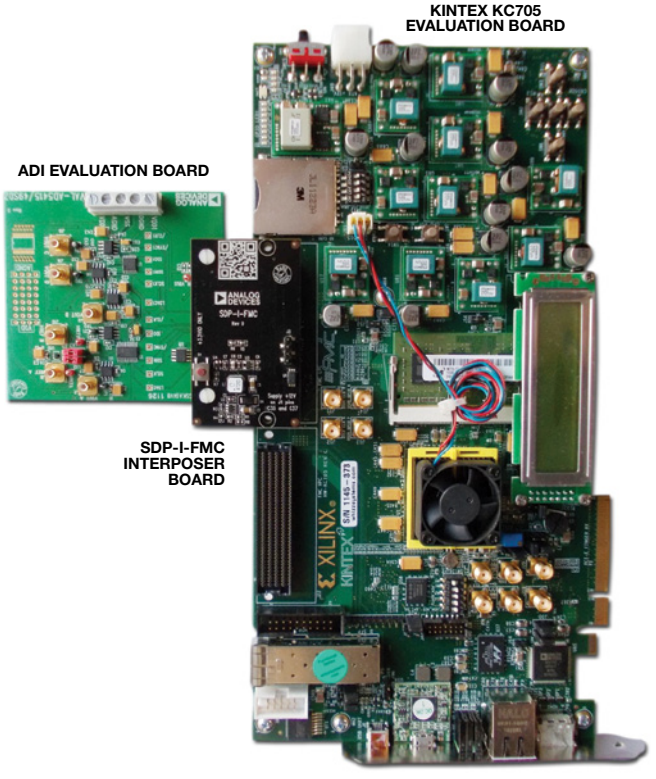

Figure 4. SDP-I-FMC interposer connects daughter board to Kintex KC705 evaluation board.

BeMicro SDK/SDP Interposer

The BeMicro SDK/SDP interposer, shown in Figure 5, allows users to connect a daughter board to an Altera Cyclone IV FPGA on the BeMicro SDK evaluation board. The BeMicro SDK/SDP interposer has the standard 120-pin connector to connect to ADI evaluation boards and a BeMicro edge connector receptacle to connect to the BeMicro SDK. The signals from the SDP connector are routed to the edge connector receptacle. The BeMicro SDK/SDP interposer can be purchased for $50 from www.arrownac.com (component name: ADI interposer). A schematic and other information can be found at www.analog.com/bemicroSDP.

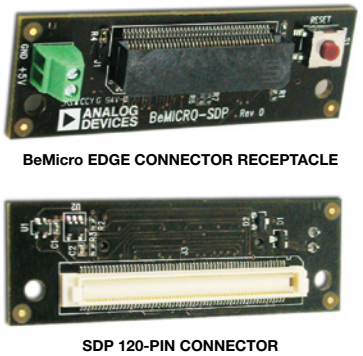

Figure 5. BeMicro SDK/SDP interposer.

BeMicro SDK

The BeMicro SDK is an Altera Cyclone IV-based hardware evaluation platform for creating, compiling, running, and debugging embedded software with the NIOS II processor. Developed by Arrow, in conjunction with Altera, it provides a small, low cost, easy to use FPGA evaluation and development platform. BeMicro SDK example projects for a large number of SDP-compatible evaluation boards are available at wiki.analog.com/resources/alliances/altera. An excellent starting point, the many available component interface examples can decrease FPGA system development time.

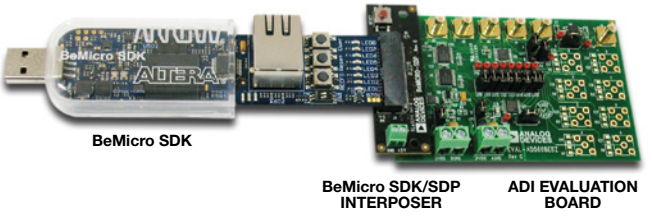

Figure 6. BeMicro SDK/SDP interposer connects daughter board to BeMicro SDK.

SDP Breakout Board

The SDP breakout board has four 120-pin connectors. Two (J1 and P1) are used with the SDP and SDP-compatible evaluation boards; and two (J2 and P2) are used with the ADSP-BF60x EZ-KIT. The primary use of this board is signal monitoring. Each probe point represents a pin on the connector, allowing an oscilloscope to monitor activity on that pin. The board is also an effective tool for prototyping when dedicated interposer board hardware does not exist.

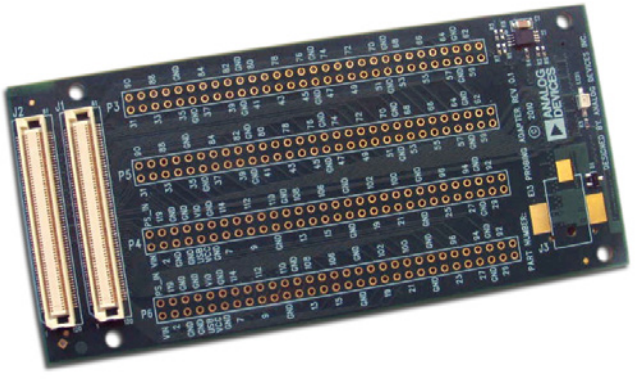

Figure 7. SDP breakout board.

The board has four rows of through-hole probe points, as shown in Figure 8. These can be easily wired to a DSP or microcontroller evaluation board. The signals from J1 and J2 are routed to P1 and P2, which are on the bottom of the SDP breakout board.

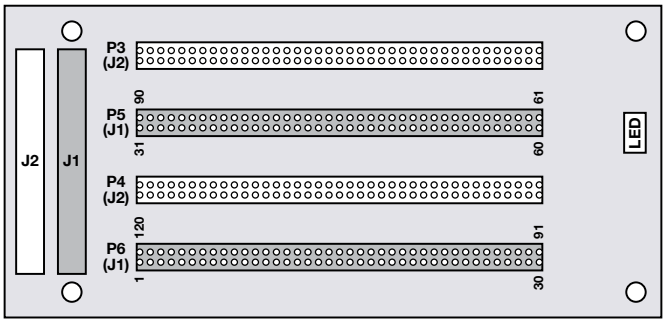

Figure 8. Top view of SDP breakout board.

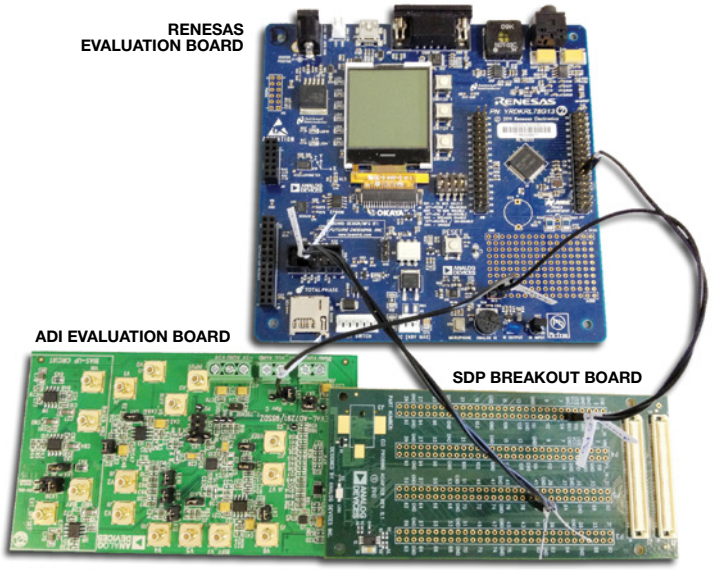

Figure 9. SDP breakout board connects the AD7291 evaluation board to Renesas evaluation board.

In the example setup, shown in Figure 9, the SPI pins of the SDP breakout board are wired to the Renesas RL78 evaluation board. The example code, available on the wiki site for many component evaluation boards, can be found via links on individual product pages on www.analog.com or in the microcontroller examples section of the ADI wiki.

Further details on the SDP breakout board, including the schematic and ordering information, can be found at www.analog.com/EI3Breakout. The board retails for $49.

Conclusion

Many options are available to help speed the design process when moving from evaluation to prototyping. With dedicated hardware, customizable hardware, and example code, ADI provides a range of solutions to meet a wide variety of needs. The System Demonstration Platform is constantly evolving, so we encourage your feedback regarding the prototyping hardware and software that would be most helpful to your design process.

Author

Rosemary Ryan [rosemary.ryan@analog.com] is an applications engineer with the Applications Technology Group. She graduated from the University of Limerick with a BEng in computer engineering in 2005 and joined ADI in Limerick in 2006. In 2010, she graduated from Waterford Institute of Technology with an MEng in electronic engineering. She currently works as part of the team responsible for the development of the System Demonstration Platform (SDP).