DesignWare
ARC AXS103 Software Development Platform
Release Notes

Version 6335-010 May 2017

Copyright Notice and Proprietary Information Notice

Contents

Customer Support

Customer support is available through SolvNet online customer support and through contacting the Synopsys Technical Support Center.

Accessing SolvNet

SolvNet includes an electronic knowledge base of technical articles and answers to frequently asked questions about Synopsys tools. SolvNet also gives you access to a wide range of Synopsys online services, which include downloading software, viewing Documentation on the Web, and entering a call to the Support Center.

To access SolvNet:

1. Go to the SolvNet Web page at http://solvnet.synopsys.com/.

2. If prompted, enter your user name and password. (If you do not have a Synopsys user name and password, follow the instructions to register with SolvNet.)

If you need help using SolvNet, click SolvNet Help in the Support Resources section.

Contacting the Synopsys Technical Support Center

If you have problems, questions, or suggestions, you can contact the Synopsys Technical Support Center in the following ways:

- Open a call to your local support center from the Web by going to http://solvnet.synopsys.com/ (Synopsys user name and password required), then clicking "Enter a Call to the Support Center."

- Send an e-mail message to your local support center.
    - E-mail support_center@synopsys.com from within North America.
    - Find other local support center e-mail addresses at http://www.synopsys.com/Support/GlobalSupportCenters.

- Telephone your local support center.
    - Call (800) 245-8005 from within the continental United States.
    - Call (650) 584-4200 from Canada.
    - Find other local support center telephone numbers at http://www.synopsys.com/Support/GlobalSupportCenters.

1
Introduction

This document describes features of the ARC AXS103 Software Development Platform Release Notes. It also provides information about supported platforms, installation structure, and release change information.

About This Release

This package contains the 1.2 release of the DesignWare ARC AXS103 Software Development Platform Release Notes.

The following release summary is available for the ARC AXS103 Software Development Platform Release Notes:

- Supported Platforms
- Features
- ARC SDP Drivers
- Bare-Metal Application Examples
- Release Details
- Installation Structure
- Documentation
- Release Change Information
- Known and Fixed Issues

Supported Platforms

The ARC AXS103 Software Development Platform Release Notes implementation supports the following products and platforms:

• Microsoft	Windows 7, Windows 10 64-bit
• DesignWare® ARC® MetaWare Development Toolkit	M-2017.03
• GNU Toolchain for DesignWare® ARC® Processors	2017.03
• MQX	2016.03c [1]
• uBOOT	v2017.01
• Linux	v4.10.9
• Xilinx LAB Tools [2,3]	14.7
• Ashling Opella XD	v1.2

Note	1. An evaluation version of MQX that has no source code ('c' means *crippled*), it is time-bombed to run only 20 minutes on the target.
	2. For firmware updates only.
	3. Use 32-bit version on Windows 10.

Features

The ARC AXS103 Software Development Platform Release Notes supports the following features:

- Rapid system bring-up for early software development.

- ARC AXC003 CPU Card with ARC HS34, HS36, HS38, and HS38x2 implemented in an FPGA.

- Multiple FPGA images stored in SPI flash ROM selected with DIP-switches.

- Broad range of interfaces including USB2.0 host, HDMI, Ethernet, I^2C, SPI, UART, GPIO and SD card reader.

- HapsTrak 2 extension connector with fast AXI tunnel up to 100 MHz for system prototyping.

- HapsTrak 3 extension connectors.

- Extensible with Digilent Pmod™ compatible and other peripheral modules.

- RTT interface for real-time trace.

- Software package includes bare-metal device drivers and example applications.
- Cores and Operating systems:

ARC HS34	(v3.00a)	MQX
ARC HS36	(v3.00a)	MQX
ARC HS38x2	(v3.00a)	MQX, uBOOT, Linux

ARC SDP Drivers

Table 1 provides an overview of the available drivers for devices on the ARC SDP Mainboard and ARC AXC003 CPU Card.

Table 1 Overview of ARC SDP Drivers

ARC SDP Mainboard	
HDMI PHY (Analog Devices)	+
DW – SPI	+
DW – UART	+
DW – I^{2}C	+
DW – GPIO	+
SPI Flash	+
DW – INTC	+
CREG (memory map configuration, interrupts, Pmod mux)	+
CGU	+
AXI tunnel – using CREG	+
Control of on-board devices using internal I^{2}C bus (RTC, EEPROM, audio codecs, HDMI)	+
NAND Flash	+
AXC003 CPU Card	
ICTL (implemented by DW – GPIO)	+
DW – GPIO	+
CREG (memory map configuration, boot mirror, boot mode and start, interrupt mux, software interrupts)	+
CGU	+
AXI tunnel – using CREG	+

Bare-Metal Application Examples

Table 2 provides an overview of the available bare-metal application examples.

Table 2 List of Bare-Metal Application Examples

Application Name	Supported Cores	Description
cpu_tile_test	ARC HS34 ARC HS36 ARC HS38	This application example displays the version of the FPGA bit-file, and current core and AXI tunnel speeds. It implements a basic rd/wr test of the memories available on the AXC003 CPU card (that is, SRAM and DDR)
haps_extension	ARC HS34 ARC HS36 ARC HS38	This application example checks that the AXI Tunnel to a HAPS system is connected to the HapsTrak 3 extension connector. It requires that a HAPS System is connected to the extension connector and that the example RTL code of the AXI Tunnel is implemented in the HAPS System. This example RTL code includes a loop-back. This example may be used to verify that the AXI Tunnel has been correctly integrated into the HAPS System.
hdmi	ARC HS34 ARC HS36 ARC HS38	This example displays a moving ARC logo on an HDMI monitor connected to the ARC SDP Mainboard.
hello	ARC HS34 ARC HS36 ARC HS38	This example prints `hello world` in the debugger console (hostlink example).
hello_uart	ARC HS34 ARC HS36 ARC HS38	This example prints `hello world` in HyperTerminal. Moreover, the timer expires every second and prints 'tick' in HyperTerminal.
pmod	ARC HS34 ARC HS36 ARC HS38	This application example demonstrates the use of the Pmod extension interface.

Application Name	Supported Cores	Description
		This program requires that a PmodTMP2 peripheral module available from Digilent Inc., which is a temperature sensor with an I^{2}C interface, is connected to the Pmod4 interface on the ARC SDP Mainboard.
rtc	ARC HS38x2	Multicore real-time clock example. It reads the time from the ARConnect RTC using one core and sends the result to HyperTerminal using another core.
selftest	ARC HS34 ARC HS36 ARC HS38	This application example displays the version of the FPGA bit-file, available peripherals and current core speed at HyperTerminal. Additionally, walking lights can be observed on the CPU LEDs and GPIO LEDs. It prints messages in HyperTerminal when one of the GPIO push buttons on the ARC SDP Mainboard is pressed. Therefore, it provides an example of using the Mainboard interrupt request. This application can be used as a self-test.
spi_flash	ARC HS34 ARC HS36 ARC HS38	An SPI-flash is available on the ARC SDP Mainboard. This device is connected to the SPI bus and is used for storing application images. This example writes, reads and verifies data in the SPI Flash memory of the ARC SDP Mainboard. Read operations use the fast read mode of the device (up to 50 MHz).

Note   All application examples (except "hello") use a HyperTerminal connection from your PC to the ARC SDP Mainboard. By default, the debug channel over the USB data port is used.

MQX Application Examples

Table 3 provides an overview of the available MQX application examples.

Table 3 List of MQX Application Examples

Application Name	Supported Cores	Description
eping	ARC HS34 ARC HS36	This application demonstrates usage of Ethernet device driver API. It can be used as a simple test of MAC hardware operation. Basically, it implements a limited functionality of ping utility making a sequence of ICMP echo requests and replying to ARP requests (if any).
leds	ARC HS34 ARC HS36	Operation of LEDs, buttons, and switches.
selftest	ARC HS34 ARC HS36	This application example displays the version of the FPGA bit-file, available peripherals, and the current core speed at HyperTerminal.
grtc	ARC HS38x2	Multicore real-time clock example. Demonstrates cross-core communications.
i2c_selftest	ARC HS38x2	Multicore I2C test. This application reads the on-board real-time clock through I2C.

Release Details

Table 4 lists the release details for the ARC AXS103 Software Development Platform Release Notes.

Table 4 Release Details

Version Number	1.2
Release Date	May 2017

Installation Structure

The ARC AXS103 Software Development Platform Release Notes consists of a set of packages. Documentation and software can be obtained from the ARC SDP download webpage. You are sent a corresponding URL during the purchasing process.

Table 5 contains a list of downloadable packages. Unzip the documentation package and refer to the *ARC AXC003 CPU Card User Guide* for instructions on getting started.

Table 5 Downloadable Packages

Package Name	Description
`axs103_documentation_v1p2.zip`	This package contains a complete documentation set.
`axs103_software_v1p2.zip`	Software package including: • Bare-metal drivers and application examples for all cores on the AXC003 CPU Card • MQX drivers and application examples for all cores on the AXC003 CPU Card • uBOOT and Linux or ARC HS38
`axs103_tools_v1p2.zip`	Tools package and drivers for using the USB data port of the ARC SDP Mainboard for communication with your PC to perform the following tasks: • Connecting a JTAG debugger • Debug console • Access on-board resources, such as SPI Flash memory • Firmware updates

Package Name	Description
`axs103_ haps_extension_v1p2.zip`	RTL source code for implementing an AXI tunnel on a HAPS system. It needs to be used if you want to use the ARC AXS103 Software Development Platform as a daughter card of a HAPS system.
`axs103_ firmware_v1p2.zip`	This package contains configuration files for the FPGA and the CPLD on the ARC SDP Mainboard, as well as configuration files for the FPGA on the AXC003 CPU Card. Installation scripts using Xilinx LAB tools v14.7 are included. The firmware comes pre-installed. This package may be needed for restoring factory settings.
`axs103_ selftest_firmware_v1p2.zip`	This package contains the self-test firmware and an installation script. The self-test firmware comes pre-installed. This package may be needed for restoring the factory settings.

Documentation

The complete documentation in PDF format is provided on the ARC SDP download webpage in the `axs103_documentation_v1p2.zip` package.
You receive a corresponding URL during the purchasing process.

A free viewer, Acrobat Reader, can be obtained from http://www.adobe.com/.

The following documents are available for the ARC AXS103 Software Development Platform Release Notes:

- *ARC SDP Mainboard User Guide*

- *ARC AXC003 CPU Card User Guide*

- *ARC AXS103 Software Development Platform Release Notes Release Notes*

2
Release Change Information

This chapter provides release change information and lists major changes from previous releases of the ARC AXS103 Software Development Platform Release Notes.

Release 1.2

This is a maintenance release of the ARC AXS103 Software Development Platform Release Notes that features the following new enhancements:

- Support for ARC HS v3.00a.
- Support for hardware I/O coherency for HS38x2.
- Support for hardware PAE for HS38x2.

The release consists of the following packages:

- `axs103_documentation_v1p2.zip`

- `axs103_firmware_v1p2.zip`

Device	Version
CPU Card FPGA (HS36)	Date: 3-5-2017 Time: 13:49
CPU Card FPGA (HS38x2)	Date: 3-5-2017 Time: 13:53
Mainboard FPGA	Date: 14-4-2017 Time: 13:21
Mainboard CPLD	Date: 3-1-2017 Time: 18:30

- `axs103_haps_extension_v1p2.zip`

- `axs103_selftest_firmware_v1p2.zip`

- `axs103_software_v1p2.zip`

- `axs103_tools_v1p2.zip`

3
Known and Fixed Issues

Known Limitations

Release 1.2

- STAR 9001178931: GMAC doesn't work after reconfiguration.

Fixed Issues

Release 1.2

- STAR 9000975333: DCCM base address of AXS103 board is inconsistent with the TCF in the AXS103 software package.
- STAR 9000980174: Slow network performance with gigabyte Ethernet support.
- STAR 9000986078: USB 2.0 doesn't work on AXS103.
- STAR 9000719222: NAND writes are slow - 100 KB/s.
- STAR 9001091421: Add CGU description.
- STAR 9001071596: Data from peripherals corrupted if tunnel and CPU freq doesn't match.
- STAR 9001104655: Clock frequency in documentation and in real life doesn't match.
- STAR 9000984509: PGU in AXS10x Mainboard has restriction on supported video modes.
- STAR 9000962922: Cannot configure ARC SDP HDMI Output to support 1.4 compliance audio modes.
- STAR 9001006239: Confirm locations of CPLD and FPGAs.
- STAR 9001143083: Update needed to AXS firmware install document.
- STAR 9000755972: DW GMAC never exits reset state after CPU reboot.
- STAR 9000896148: IOC: NOSLC USB 1.1 driver hangs in ohci_irq due to corrupted descriptor.
- STAR 9000979181: USB Wi-Fi adapter silently dies on heavy load [AXS103, USB2.0].
- STAR 9000982129: ohci driver crashes on USB mass-storage device insertion.
- STAR 9000983163: Second core won't start in SMP Linux.
- STAR 9001006240: Provide block diagrams showing functionality on GPIO0 and GPIO1.
- STAR 9001006271: What can trigger the AXC003 interrupt?
- STAR 9001019877: SLC parameters are not mentioned in AXS103 documentation.

- STAR 9001039437: Batch scripts gohs34 and gohs36 are failing to run, debug AXS103 MQX examples.
- STAR 9001039483: HS38x2 Core frequency from selftest mismatches with numbers in documentation.
- STAR 9001042144: AXC003 user guide documents incorrect offsets for address decoder cregs.
- STAR 9001043557: Update eping example procedure in README file.
- STAR 9001045064: Linux on AXS103 (1.1) locks up on DMA when IOC is enabled h/w s/w
- STAR 9001046039: HS38 frequency value mismatch between self-test application and ARC Linux.
- STAR 9001046785: Need updates on boot mirror description and usage.
- STAR 9001055123: Grammatical review of AXC003 User Guide.
- STAR 9001074205: GMAC doesn't enter promiscuous mode.
- STAR 9001178444: U-Boot doesn't start automatically on reset with axc001 tile.
- STAR 9000730113: USB keyboard fails to work on re-attach.