Digilent Arty A7-35T

Digilent Arty A7-35T Artix-7 FPGA Development Board User Manual

1. Introduction

This manual provides essential information for the setup, operation, maintenance, and troubleshooting of your Digilent Arty A7-35T Artix-7 FPGA Development Board. The Arty A7-35T is designed for makers and hobbyists, offering a versatile platform for digital design and embedded systems development using Xilinx Artix-7 Field-Programmable Gate Arrays (FPGAs).

2. Product Overview

The Arty A7-35T board integrates a Xilinx Artix-7 FPGA with various peripherals and expansion options, making it suitable for a wide range of projects. Key features include:

- Xilinx Artix-7 FPGA (XC7A35T-1CSG324C)
- Multiple Pmod connectors for peripheral expansion
- Arduino/chipKIT shield connector
- Ethernet port
- USB-JTAG programming port
- User LEDs, switches, and buttons
- DDR3 SDRAM

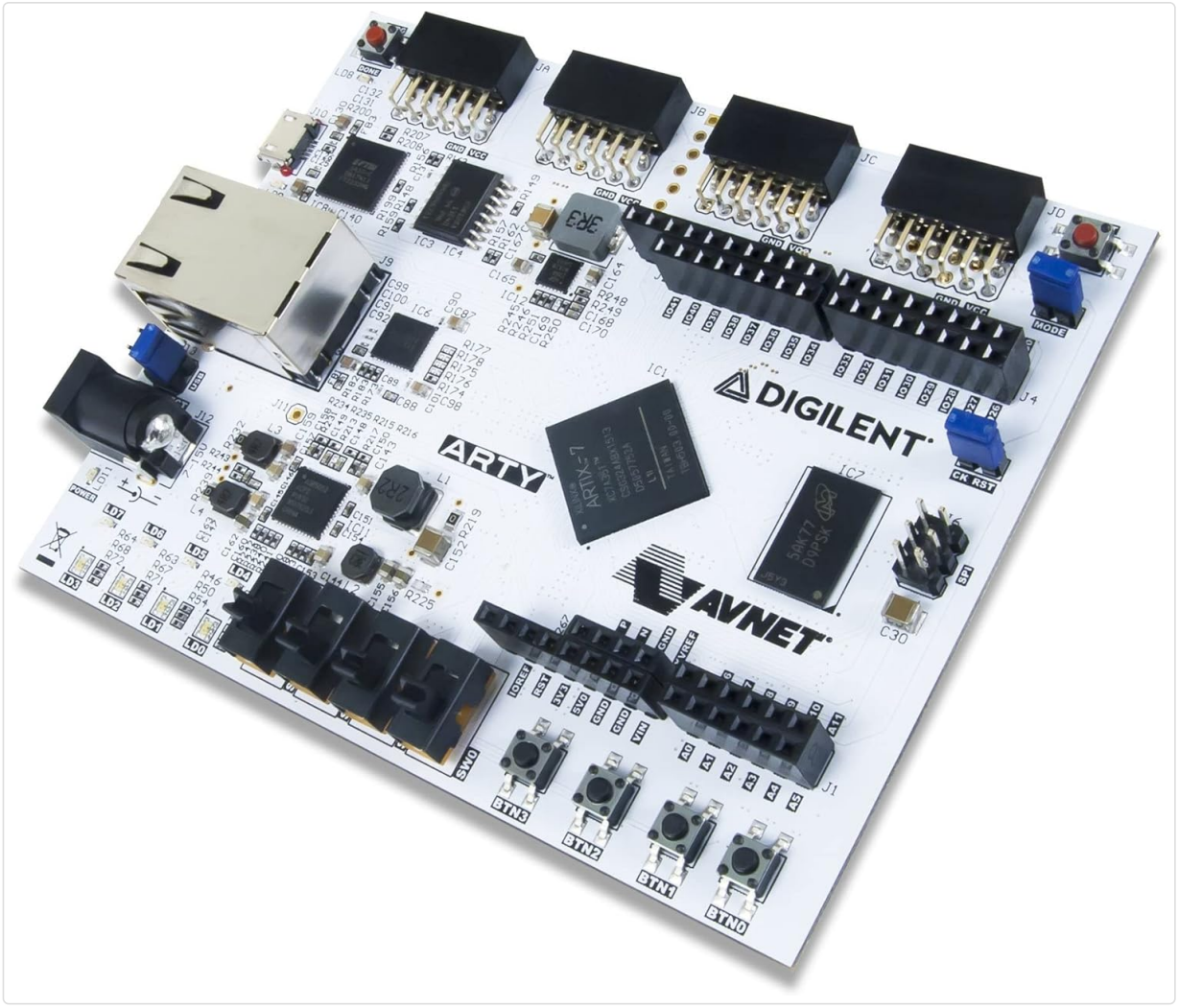


Figure 2.1: Top-down view of the Digilent Arty A7-35T Artix-7 FPGA Development Board. This image displays the overall layout of the board, including the central Artix-7 FPGA chip, various connectors, buttons, and LEDs.

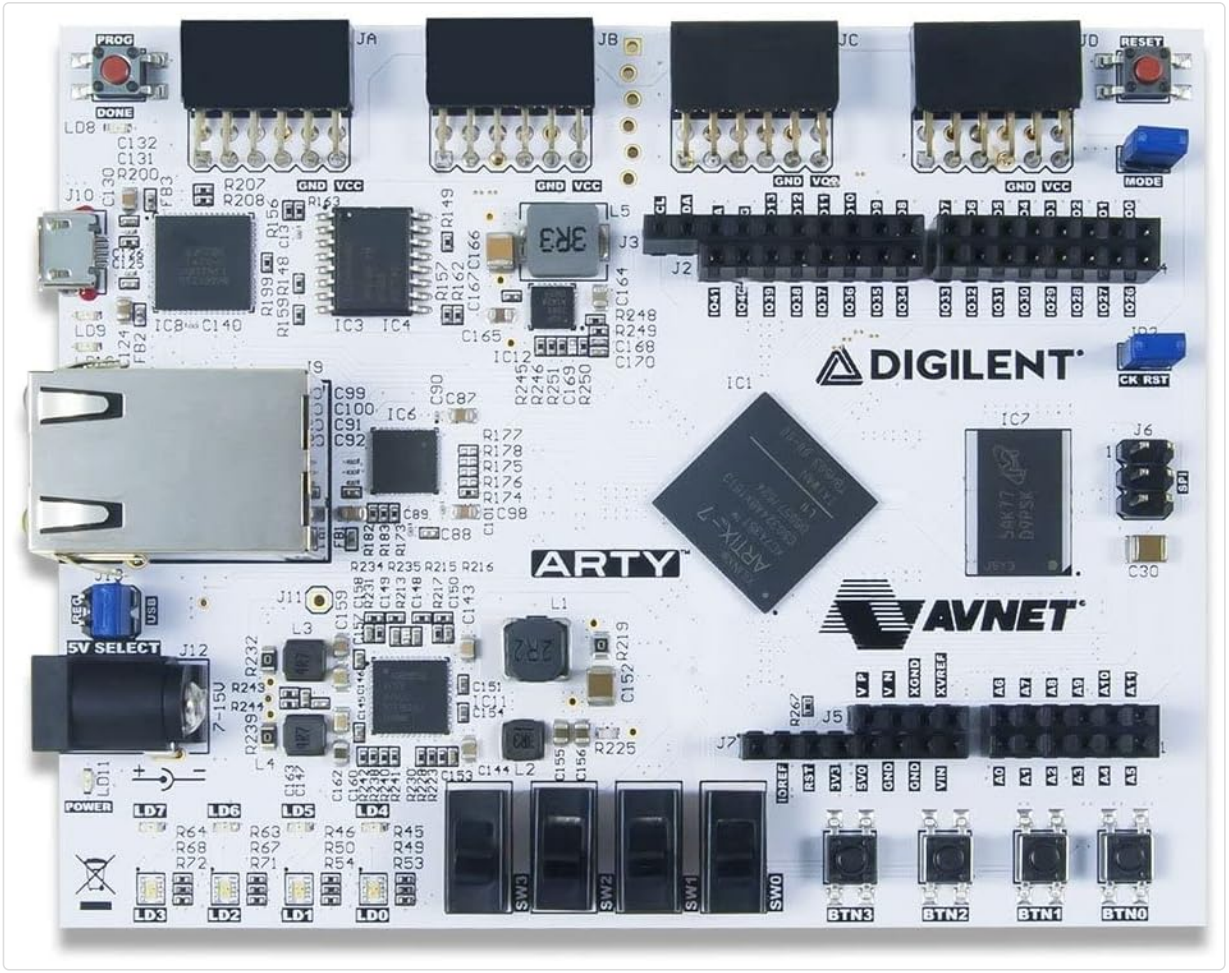


Figure 2.2: Detailed top view of the Arty A7-35T FPGA board. This image highlights the placement of the Artix-7 FPGA, Pmod headers, Arduino shield connectors, Ethernet port, and user interface components like switches and buttons.

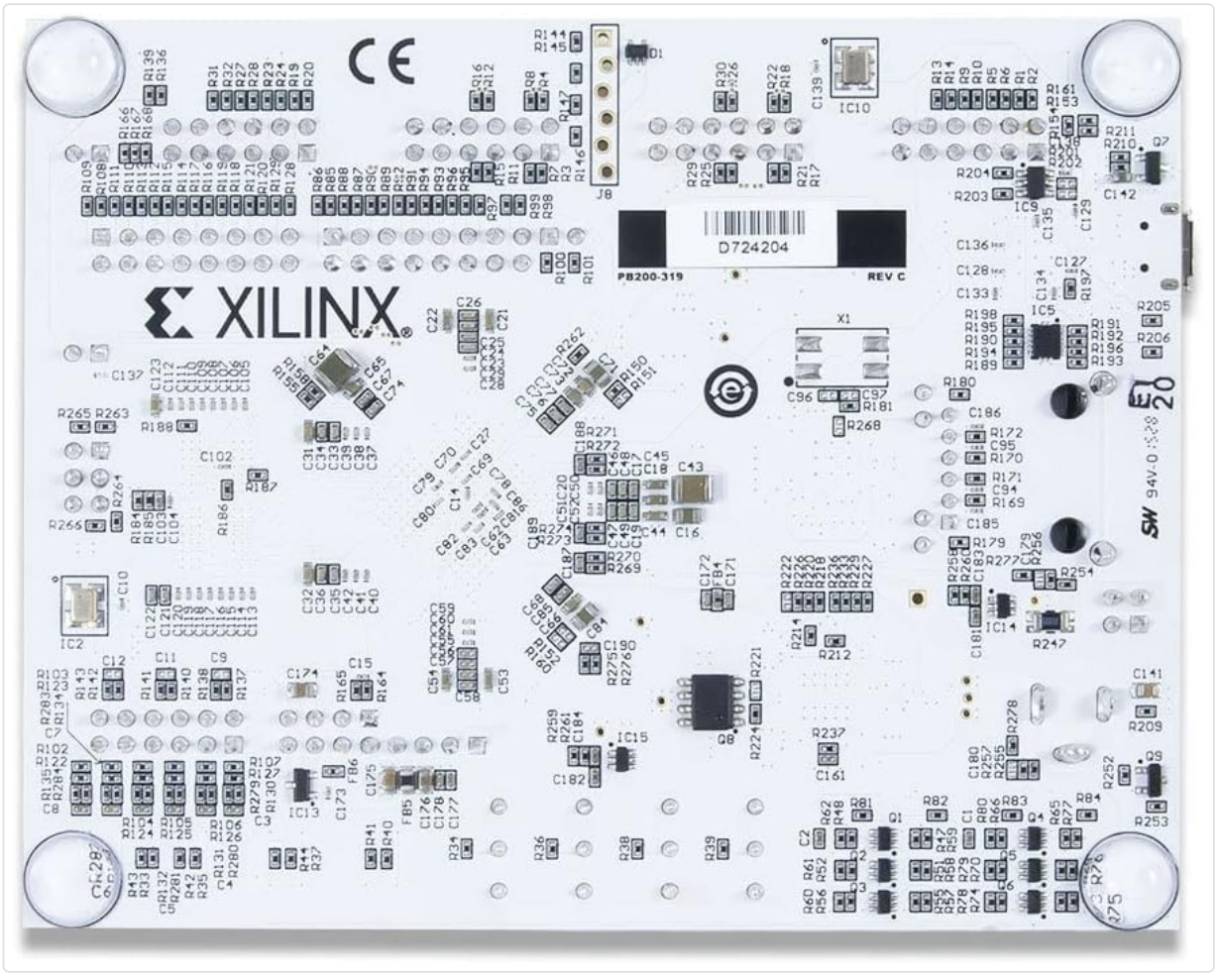


Figure 2.3: Bottom view of the Arty A7-35T FPGA board. This perspective shows the underside of the circuit board, revealing additional components and traces.

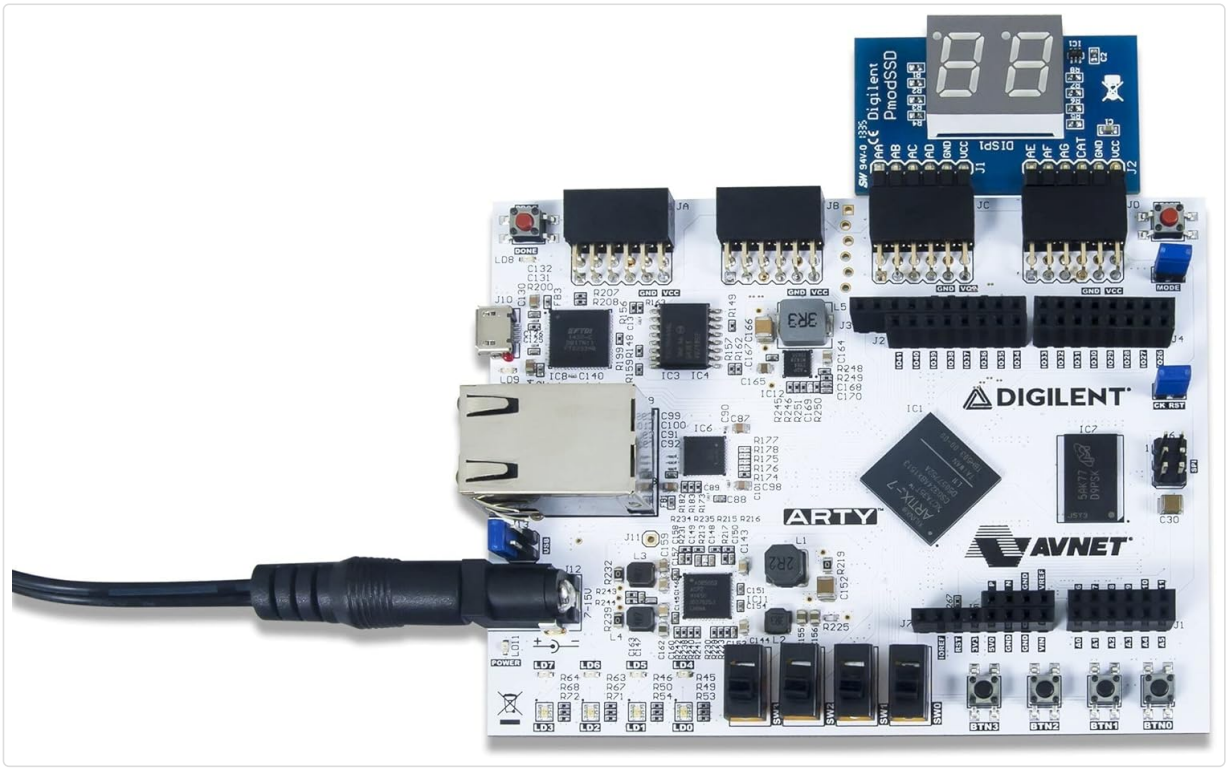


Figure 2.4: Arty A7-35T board demonstrating connectivity with a Digilent Pmod accessory. This image illustrates how external modules can be interfaced with the board via the Pmod headers.

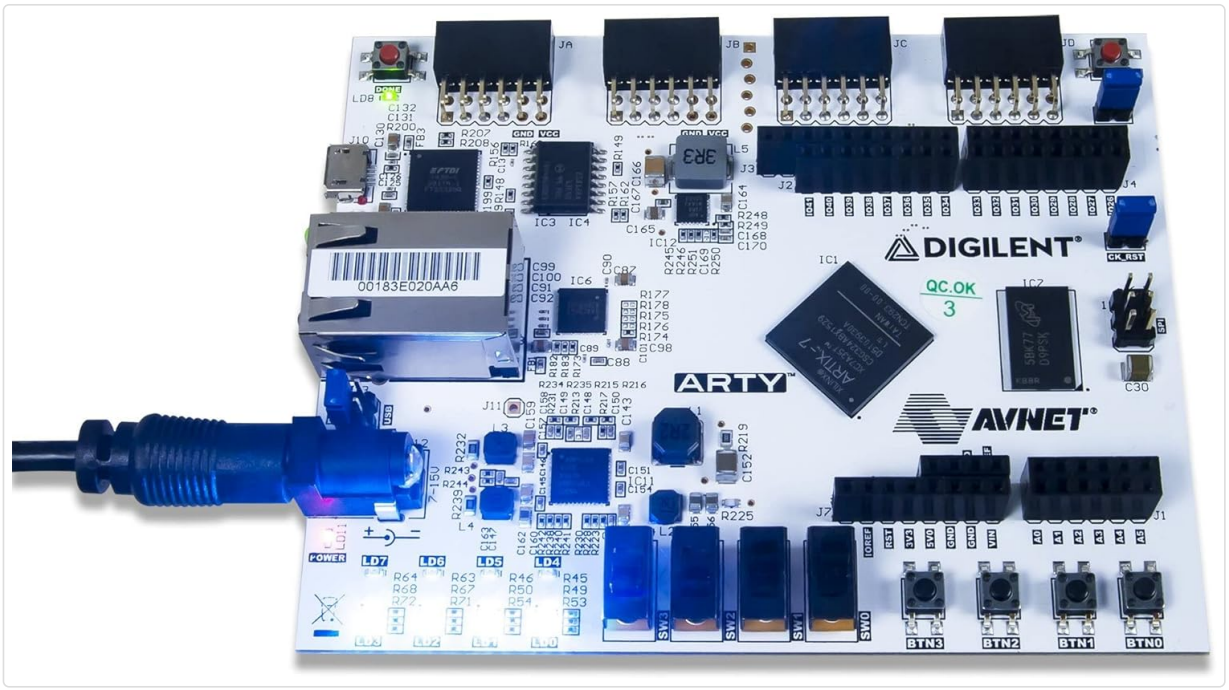


Figure 2.5: The Arty A7-35T board in an operational state, indicated by illuminated power and user LEDs. This shows the board receiving power and potentially running a basic demonstration program.

Figure 2.6: Side profile of the Arty A7-35T board, showcasing the various connectors such as the power input, USB port, and Ethernet port.

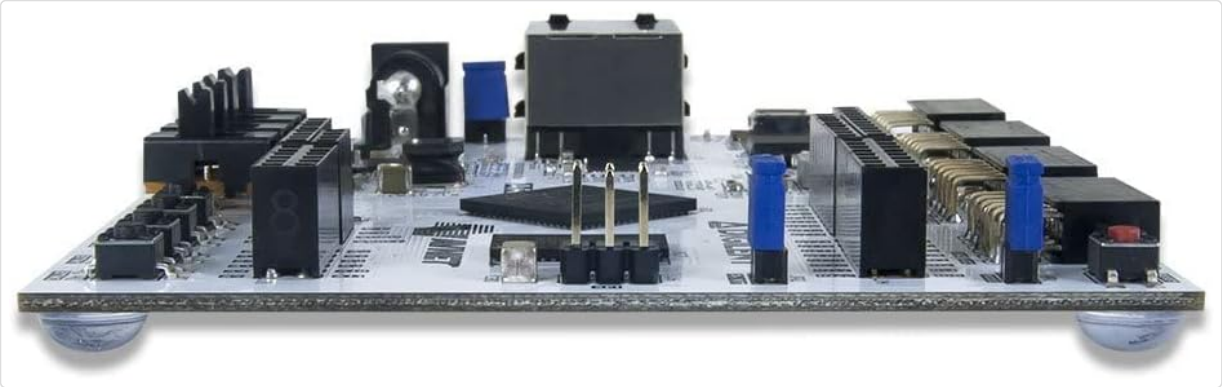


Figure 2.7: A different side view of the Arty A7-35T board, providing a perspective on the board's height and the arrangement of its components from the side.

3. Setup

3.1. Unpacking and Inspection

Carefully remove the Arty A7-35T board from its packaging. Inspect the board for any visible damage. Ensure all components are securely attached.

3.2. Power Connection

The Arty A7-35T can be powered via the USB port or an external 7V-15V power supply connected to the barrel jack. For stable operation, especially when using power-hungry peripherals, an external power supply is recommended.

1. Connect the USB cable to the micro-USB port (J10) on the board and to your computer.
2. Alternatively, connect a compatible external power supply to the barrel jack (J12).
3. Ensure the power select jumper (J11) is set to the appropriate source (USB or EXT).

3.3. Software Installation

To develop and program the Arty A7-35T, you will need the Xilinx Vivado Design Suite. Follow the instructions provided by Xilinx for installation. Digilent also provides board support files and example projects for Vivado.

- Download and install Xilinx Vivado Design Suite from the Xilinx website.
- Install the Digilent board files for Arty A7, typically found on the Digilent website's resource center.
- Ensure USB drivers for the JTAG programmer are correctly installed.

4. Operating Instructions

4.1. Powering On

Once connected to a power source, the power LED (LD11) should illuminate, indicating the board is receiving power. If using USB power, your computer should detect the device.

4.2. Programming the FPGA

The FPGA can be programmed using the Xilinx Vivado Design Suite via the onboard USB-JTAG programmer.

1. Open Xilinx Vivado and create or open an FPGA project targeting the Artix-7 XC7A35T-1CSG324C.
2. Generate a bitstream (.bit file) for your design.
3. Use the Hardware Manager in Vivado to connect to the Arty A7 board.
4. Program the device with your generated bitstream.

The FPGA can also be configured from a Quad-SPI flash memory. Refer to Digilent documentation for details on programming the flash memory.

4.3. Using Onboard Peripherals

The Arty A7-35T includes several user-configurable peripherals:

- **LEDs (LD0-LD3, LD4-LD7):** Eight user LEDs for visual feedback.
- **Switches (SW0-SW3):** Four slide switches for digital input.
- **Buttons (BTN0-BTN3):** Four push buttons for momentary input.
- **Reset Button (CK_RST):** Resets the FPGA configuration.

These peripherals are connected to specific FPGA pins and can be controlled or read from your FPGA design.

4.4. Expansion Connectors

The board features Pmod connectors and an Arduino/chipKIT shield connector for expanding functionality with various modules. Ensure proper voltage levels and pin assignments when connecting external hardware.

5. Maintenance

5.1. General Care

Handle the Arty A7-35T board with care to prevent damage from electrostatic discharge (ESD). Always hold the board by its edges. Store the board in an anti-static bag when not in use.

5.2. Cleaning

If necessary, gently clean the board with a soft, dry brush or compressed air to remove dust. Avoid using liquids or abrasive materials.

5.3. Firmware Updates

Periodically check the Digilent website for any firmware updates for the onboard USB-JTAG programmer or other components. Follow the provided instructions carefully for any update procedures.

6. Troubleshooting

6.1. Power Issues

- **No Power LED (LD11):** Check power source connection (USB or external adapter) and ensure the power select jumper (J11) is correctly set. Verify the external power supply provides 7V-15V.

6.2. USB Connectivity Problems

- **Board not detected by computer:** Ensure USB cable is securely connected. Try a different USB port or cable. Verify that the necessary USB drivers for the Digilent JTAG programmer are installed on your computer.

6.3. FPGA Programming Errors

- **Vivado Hardware Manager cannot find device:** Confirm USB connection and driver installation. Ensure the board is powered on. Check that the correct device (Artix-7 XC7A35T) is selected in your Vivado project.
- **Programming fails:** Verify your bitstream is correctly generated and compatible with the Artix-7 FPGA. Ensure no other software is interfering with the JTAG connection.

6.4. Unexpected Behavior

- **Design not functioning as expected:** Review your HDL code and constraints. Use Vivado's debugging tools (e.g., ILA, VIO) to inspect internal signals.
- **Board becomes unresponsive:** Press the CK_RST button to reset the FPGA configuration. If issues persist, power cycle the board.

7. Specifications

Feature	Value
Brand	Digilent
Model Name	410-319-1
FPGA	Xilinx Artix-7 (XC7A35T-1CSG324C)
RAM	LPDDR
Memory Speed	667 MHz
Ram Memory Installed Size	256 MB
Memory Storage Capacity	256 MB
Connectivity Technology	Ethernet
Operating System Compatibility	Linux (and Windows/macOS with Vivado)

Feature	Value
Item Weight	0.705 ounces
Product Dimensions (LxWxH)	4 x 3 x 1 inches
Manufacturer	Digilent
Date First Available	October 29, 2015

7.1. What's in the Box

- Digilent Arty A7-35T Artix-7 FPGA Development Board
- Access to 2 free eBooks: IDD VHDL Edition and Real Digital book

8. Warranty Information

For detailed warranty information regarding your Digilent Arty A7-35T Artix-7 FPGA Development Board, please refer to the official Digilent website or contact Digilent customer support directly. Warranty terms and conditions may vary by region and purchase location.

9. Support

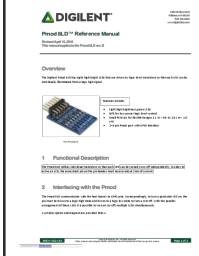
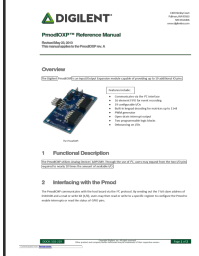
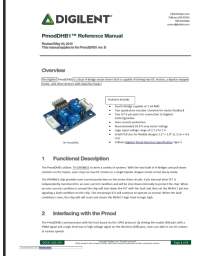
For further assistance, technical documentation, tutorials, and community forums, please visit the official Digilent website:

- **Digilent Website:** https://digilent.com/
- **Product Resource Center:** Look for the Arty A7-35T on the Digilent website for specific documentation, schematics, and example projects.
- **Community Forums:** Engage with other users and Digilent engineers for support and project ideas.

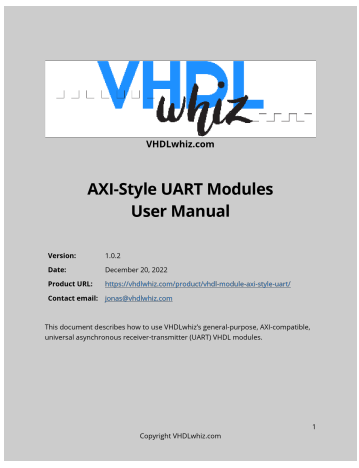
You can also visit the Digilent Store on Amazon for product information and related items.

Related Documents - Arty A7-35T

	Digilent CoolRunner-II Starter Board Reference Manual A comprehensive reference manual for the Digilent CoolRunner-II Starter Board, a USB-powered development platform featuring a Xilinx CoolRunner-II CPLD, power supplies, oscillator, I/O devices, and expansion connectors.

	[Digilent FX12 Board Errata and Modifications] Official errata document from Digilent detailing modifications made to the FX12 development board, specifically addressing JTAG signal routing issues on Rev B boards.
	[Digilent Pmod 8LD Reference Manual - High-Brightness LED Module] Detailed reference manual for the Digilent Pmod 8LD, a compact module featuring eight high-brightness green LEDs controlled via GPIO pins and BJTs for low-power logic-level operation.
	[Digilent PmodIOXP Input/Output Expansion Module Reference Manual] This reference manual details the Digilent PmodIOXP, an Input/Output expansion module designed to provide up to 19 additional I/O pins. It highlights features such as I²C communication, a 16-element FIFO, built-in keypad decoding, and PWM generation, along with functional descriptions, interfacing details, pinout, and physical dimensions.
	[Digilent PmodDHB1 Dual H-Bridge Motor Driver Reference Manual] Reference manual for the Digilent PmodDHB1, a dual H-bridge motor driver capable of controlling two DC motors or a bipolar stepper motor, featuring over-current protection and quadrature encoder feedback.
	[Digilent PmodRS485 Reference Manual] This reference manual provides detailed information on the Digilent PmodRS485, a high-speed RS-485 communication module offering signal and power isolation for robust data transfer in noisy environments. It covers features, functional description, interfacing, pinouts, and physical dimensions.

Documents - Digilent – Arty A7-35T



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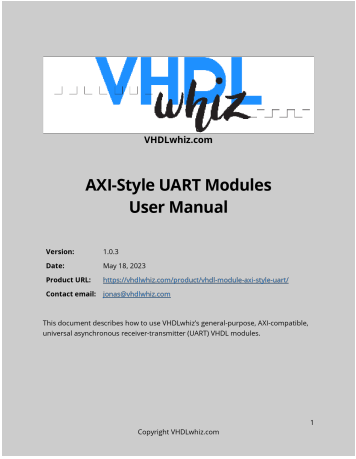

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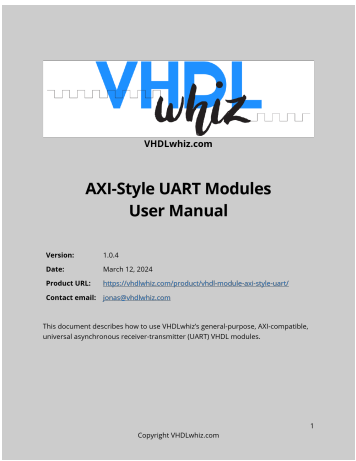

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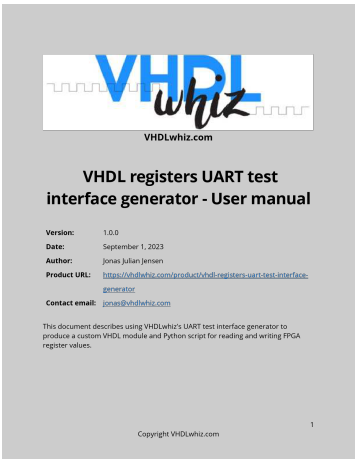

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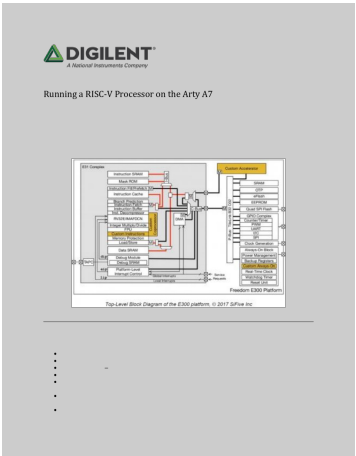

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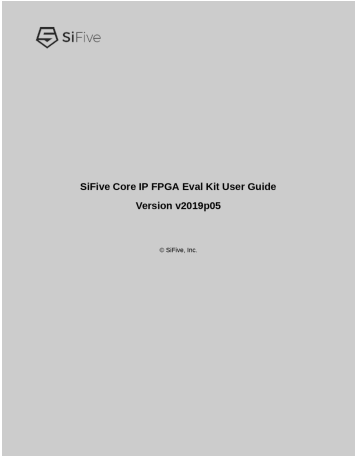

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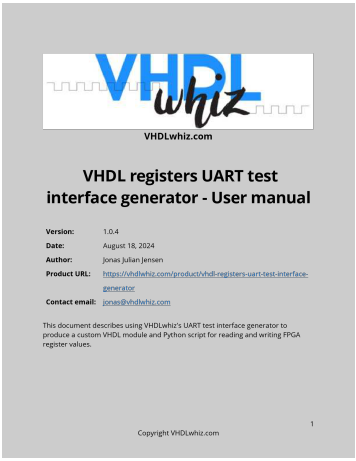

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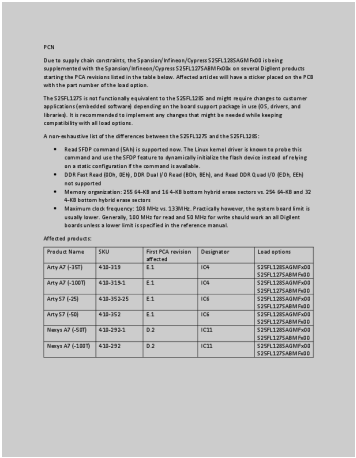

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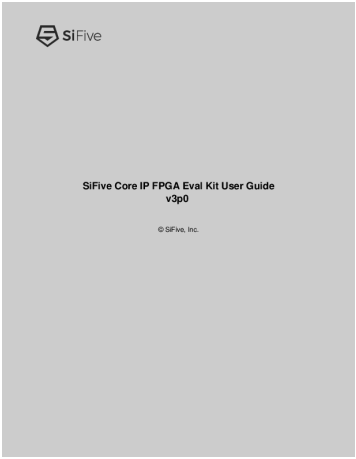

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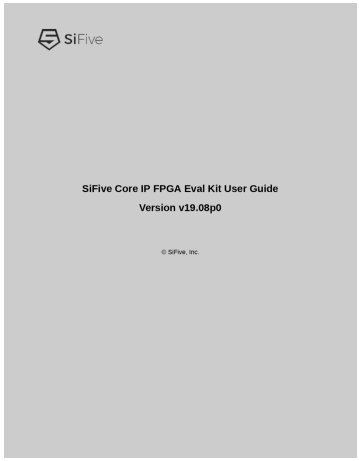

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