

## Design and Verification of AHB Protocol Using System Verilog and Universal Verification Methodology (UVM)

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### ABSTRACT :

Recently, VLSI technology has improved significantly and more transistors can be incorporated in a chip. A System on-Chip (SoC) Configuration have number of blocks are integrated on a single chip. Numerous blocks are integrated in single IC, but to access their function, they requires a powerful communication architecture. This can only be achieved by using on-chip bus architecture to meet their requirements. Different Companies has various on-Chip Bus architectures but one of the most suitable architecture is AMBA by ARM. AMBA consist of three buses, namely, Advanced System Bus (ASB), Advanced Peripheral Bus (APB) and Advanced High Performance Bus (AHB); when compared to other two buses AHB is high performance, high bandwidth and for high clock frequency system modules the System designers select AHB as their primary choice. The AHB (Advanced High-performance Bus) is a superior bus in AMBA (Advanced Microcontroller Bus Architecture) family. It is a norm for intercommunication of modules in a framework. The AHB (Advanced High performance) bus Standards are characterized by ARM which supports for the communication of on-chip memories, processors and interfaces of external off-chip memory. Here the basic blocks such as master, slave, decoder, and arbiter are used to design and verify an AHB that supports multiples master and multiples slave. The conventional way of verification is simulation based. As the Technology improves the complexity of IC's has been increased. Thus, time spent on verification has also been increased. The main focus is to design of AHB protocol in Verilog and verify using Hardware verification language such as System Verilog and standard Methodology such as Universal Verification Methodology (UVM). QuestaSim (Advanced verification tool from Mentor Graphics) is an EDA tool used to simulate and verify the design and obtain Coverage report.

**Keywords** – AMBA, AHB, APB, ASB, OCB, SOC, UVM

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## L. INTRODUCTION

### 1.1 About AMBA bus

The AMBA is an Advanced Microcontroller Bus Architecture defined by ARM, it is an open standard widely used for an on-chip bus system. The standard is intends to simplify the component design by allowing the use of interchangeable parts the within the SoC style. It promotes the use of holding parts, so that a minimum of a neighborhood of the SoC can be reconstructed, instead of having to rewrite it entirely each time. AHB (Advanced High-performance Bus), ASB (Advanced System Bus), and APB (Advanced Peripheral Bus) are the bus groups defined in the AMBA. AHB, The AHB is employed for high-performance, high frequency architecture. These applications includes are ARM cores and high-speed RAM inside the system, Nand Flash, DMA and Bridge links. [1] The APB is used for connecting external devices such as UART, keypad and timer, and has low performance requirements, while it is

used for optimizing power consumption. AMBA is the Standard bus-based microcontroller typical feature a high-performance system hub bus (AHB or ASB) that supports for external memory bandwidth, including CPUs, on-chip memories, and other direct data access (DMA) devices. For most of the transmission between various units, such as CPUs, on-chip memories, and DMA, the bus serves as a high bandwidth interface.

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## **Table of Contents Pdf Systemverilog Design Verification Using Uvm**

1. Understanding the eBook Pdf Systemverilog Design Verification Using Uvm
  - The Rise of Digital Reading Pdf Systemverilog Design Verification Using Uvm
  - Advantages of eBooks Over Traditional Books
2. Identifying Pdf Systemverilog Design Verification Using Uvm
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Pdf Systemverilog Design Verification Using Uvm
  - User-Friendly Interface
4. Exploring eBook Recommendations from Pdf Systemverilog Design Verification Using Uvm
  - Personalized Recommendations
  - Pdf Systemverilog Design Verification Using Uvm User Reviews and Ratings
  - Pdf Systemverilog Design Verification Using Uvm and Bestseller Lists
5. Accessing Pdf Systemverilog Design Verification Using Uvm Free and Paid eBooks
  - Pdf Systemverilog Design Verification Using Uvm Public Domain eBooks
  - Pdf Systemverilog Design Verification Using Uvm eBook Subscription Services
  - Pdf Systemverilog Design Verification Using Uvm Budget-Friendly Options

6. Navigating Pdf Systemverilog Design Verification Using Uvm eBook Formats
  - ePUB, PDF, MOBI, and More
  - Pdf Systemverilog Design Verification Using Uvm Compatibility with Devices
  - Pdf Systemverilog Design Verification Using Uvm Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Pdf Systemverilog Design Verification Using Uvm
  - Highlighting and Note-Taking Pdf Systemverilog Design Verification Using Uvm
  - Interactive Elements Pdf Systemverilog Design Verification Using Uvm
8. Staying Engaged with Pdf Systemverilog Design Verification Using Uvm
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Pdf Systemverilog Design Verification Using Uvm
9. Balancing eBooks and Physical Books Pdf Systemverilog Design Verification Using Uvm
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Pdf Systemverilog Design Verification Using Uvm
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Pdf Systemverilog Design Verification Using Uvm
  - Setting Reading Goals Pdf Systemverilog Design Verification Using Uvm
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Pdf Systemverilog Design Verification Using Uvm
  - Fact-Checking eBook Content of Pdf Systemverilog Design Verification Using Uvm
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
  - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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