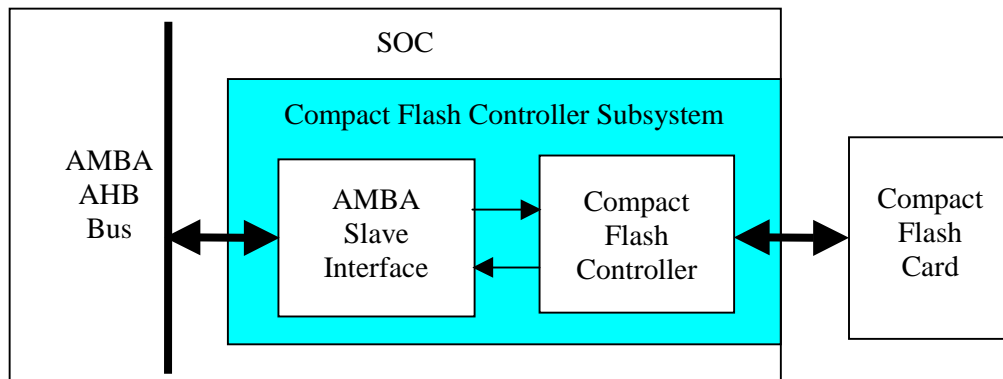


## **AU-MB4000: Compact Flash Controller AMBA Subsystem Core**

### **AMBA AHB Bus Compact Flash Controller**

The AU-MB4000 Compact Flash Controller AMBA Subsystem provides a Compact Flash Controller peripheral subsystem for AMBA based SOCs. It contains a Compact Flash Controller that connects seamlessly to the AMBA AHB Bus as an AMBA Bus slave. The Compact Flash Controller AMBA Subsystem Core is available as a synthesizable Verilog model from Aurora VLSI, Inc. Contact [CustomerService@auroravlsi.com](mailto:CustomerService@auroravlsi.com).



The Compact Flash Controller Subsystem includes a versatile compact flash card controller that supports CompactFlash and CF+ according to the "CF+ and CompactFlash Specification Revision 3.0". It functions in PC card memory, PC card I/O, and true IDE modes. Additionally, IDE multiword DMA and Ultra DMA are included.

Internal to an SOC, the Compact Flash Controller Subsystem is a bus slave peripheral on the AMBA AHB Bus. The Compact Flash Controller Subsystem can interface to either a 32 bit or 64 bit AMBA AHB Bus. A Verilog parameter indicates the AMBA Bus width. AMBA Bus transactions that target the compact flash card are recognized by the AMBA Slave Interface of the Compact Flash Controller Subsystem. The AMBA Slave Interface initiates compact flash card requests at the requester interface of the Compact Flash Controller block. To complete the AMBA Bus transaction, the AMBA Slave Interface drives the appropriate AMBA response onto the AMBA Bus.

Compact Flash Controller AMBA Subsystem features are summarized:

Compact Flash Controller

- CompactFlash and CF+ version 3.0
- PC card memory, PC card I/O, and true IDE modes
- IDE multiword DMA and Ultra DMA modes
- 8 bit or 16 bit Compact Flash Controller data bus
- User configurable reset values and fully programmable compact flash card timing parameters
- Supports all compact flash card commands
- Supports direct command block accesses
- Supports common memory, attribute memory, and IO accesses (PC card modes)
- Interrupt or host processor polling for Compact Flash command completion

AMBA Slave Interface

- AMBA AHB Bus slave
- 32 bit or 64 bit AMBA AHB Bus- user configurable
- Supports all required AMBA AHB Bus features
- Implements AMBA Bus timeout and RETRY response
- Read data prefetching
- Write data packing
- Same cycle device request/response is supported for highest throughput
- Handles all data packing/unpacking and data alignment for data transfer sizes that do not match the AMBA Bus width and/or Compact Flash data bus width
- User configurable for big or little endian AMBA Bus and memory

The core is delivered as a synthesizable RTL Verilog model. Deliverables include:

- RTL Verilog source code model of the core
- Verilog testbench and test cases
- Synthesis scripts examples
- Complete detailed documentation and training class notes

### **Compact Flash Controller**

The Compact Flash Controller Subsystem includes the AU-M4000 Compact Flash Controller Core. Additional logic at the requester interface of the Compact Flash Controller provides an AMBA Bus slave interface, read prefetching logic, and write data packing.

The Compact Flash Controller data bus width to the compact flash card, is user configurable to 8 or 16 bits. Compact flash card timing parameters are both user configurable at reset with Verilog parameters and software programmable to support a wide range of compact flash card speed grades and system clock frequencies.

The Compact Flash Controller supports all compact flash card commands listed in the "CF+ and CompactFlash Specification Revision 3.0". In PC card modes, the host processor accesses the compact flash card common memory, attribute memory, and I/O space using the Compact Flash Controller. Additionally, the host processor may directly read and write compact flash card command block locations using the Compact Flash Controller.

The host processor initiates compact flash card operations by writing commands to the Compact Flash Controller. When a compact flash card operation completes, the Compact Flash Controller optionally signals a maskable interrupt to the host processor. The host processor may also poll Compact Flash Controller registers to determine when a compact flash card operation has completed.

### **AMBA Slave Interface**

The AMBA Slave Interface of the Compact Flash Controller Subsystem, accepts compact flash requests from the AMBA Bus. The AMBA Slave Interface supports all required AMBA AHB Bus features including all AMBA burst and wrapping types, AMBA sizes up to the AMBA Bus width, and all AMBA Bus responses. When the AMBA Bus data transfer size does not match the AMBA Bus width or Compact Flash data bus width the AMBA Slave Interface packs and/or unpacks the data and aligns the data, for the most efficient transfer of data to/from the compact flash card and to/from the AMBA Bus.

The AMBA Slave Interface can respond in the cycle after it receives an AMBA Bus request. This ensures a slave response on the AMBA Bus with no wait states, and therefore highest system performance. To support this fast response time, read data is prefetched whenever possible.