H009/PP194 IP Cores for FPGAs

IPH9194D
-H009
-PP194
IP Cores with Local or PCI Back-End

Compact, Robust, Reliable
MIL-STD-IP-Cores

Key Features and Benefits

- H009 or PP194 Intellectual Property for FPGAs and ASIC
- Can be integrated with Sital's Mil-Std-1553 IP cores, so a single IP for all interfaces
- Backend Compatible to *Enhanced DDC® Mini-Ace®* and *Micro-Ace®* interface and functionality, works with existing software drivers
- Local Bus or 33/66MHz PCI back-end interface
- Small FPGA area utilization
- Modular architecture allowing flexible implementations
- Provided with full verification environment
- Based on vendor and technology independent VHDL code
- Various configurations available: Local Bus and PCI interface
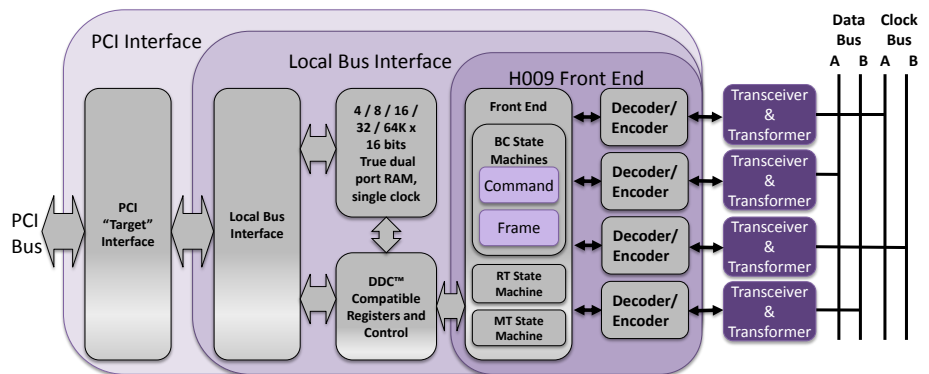
Combining the benefits of programmable devices (FPGA) and Sital's IP Cores provides a small-size, robust, reliable, flexible, future-proof and cost-effective solution for Mil-Std-1553, H009 or PP194 interface.

Sital's IP cores are designed for any requirement and application. Customers can choose between various configurations and interfaces. From the very small and simple Front-End (FE), designed for simple applications, where no CPU is controlling the system, to the most complex implementations, where a Local Bus is used by the CPU (D) or where PCI bus is used (PCI).

The IP9194D cores are software compatible to *DDC® Mini-Ace®* and *Micro-Ace®* components, thus customers can re-use existing 1553 architectures and know-how.

All IP Cores work with any FPGA, clock frequency and the Sital Discrete transceiver, providing the most robust, yet flexible, solution.

More products from Sital:
- *Mil-Std-1553 Components*
- *Mil-Std-1553 Boards*
- *Mil-Std-1553 Testers*
- *More IP Cores:*
  - ARINC 429 IP Core
  - EBR 1553
  - H009, PP194
  - CAN Bus

More information available at **www.sitaltech.com**

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Specifications

Compatibility

- H009/MacAir
- PP194 (Wmux)
- 1Mbps Data Rate
- Sinus (H009) or Trapezoid signal when used with Sital Transceiver
- Enhanced DDC® Micro-ACE® interface

PCI (BRM1553PCI)

- PCI specification 2.3 compliant
- 33MHz performance (66MHz optional)
- 32 bit datapath
- Zero wait states burst mode
- Full Target functionality

RAM (BRM1553PCI & BRM1553D)

- 4, 8, 16, 32, 64K by 16 bits Dual Port RAM (Limited by FPGA resources only)

Clock

- Any even frequency from 12MHz and higher (12, 14, 16… 98, 100MHz, …)
- Including 33MHz for PCI and 125MHz for PCI Express implementations

Supported FPGAs

- Any FPGA with sufficient number of LUTs and Dual-Port memory
- FPGA families from the following vendors: Xilinx, Altera, Lattice, Actel

* For other FPGAs or ASIC please consult Sital

Deliverables

- EDIF net list for the desired core (BC/RT/MT) for FPGA family and memory
- User's manual
- Sample VHDL code that incorporates the core
- Synthesis script for sample code

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H009/PP194 IP Cores

Cores for Any Mil-Std-1553 Implementation

The IP9194D-H009 and IP9194D-PP194 IP Cores incorporate a backend logic that arranges the messages in a predefined memory structure, similar to DDC® Mini-Ace® and Micro-Ace®. This simplifies the interface between the H009/WB194 bus and the local CPU. Both cores can act as a full replacement (2nd source) for DDC® devices as the data is arranged in the same way and the back-end interface is software compatible.

Used in conjunction with Sital's Mil-Std-1553 IP cores and Discrete transceiver design, these Ip cores provide a single solution for all Avionics and Weapon Bus requirements. Users can build a single hardware to support all various protocols.

Sital's IP Cores require very small space from FPGA for complex applications.
The following table summarizes the various available configurations:

IP Core	Supported configurations	FPGA Memory Required	Clock Frequency	Approx. Area Utilization LUT
BRM1553FE	BC/RT/MT	NO	12MHz and up (*)	1000 (**)
BRM1553D	BC/RT+MT	YES	12MHz and up (*)	4500 (**)
BRM1553PCI	BC/RT+MT	YES	33 / 66MHz	5500 (**)

(*) Clock Frequency can be any even number of 12MHz or more (12, 14, 16MHz…). Maximum clock frequency depends on FPGA and the actual place & route.

(**) These numbers are approximate. Actual area usage may vary according to core configuration and FPGA.

Backend Interface

Includes *DDC's® Micro-ACE®* interface over Local Bus or PCI, compatible with existing drivers and applications.

- No need to rewrite drivers' code
- Eliminates replacement risk

Manchester Decoder

The unique Manchester decoder can work with any clock or PCI's 33/66MHz clock, reduce clock sources and clock domains on board (reduces EMI/RFI).

Advanced algorithms for filtering out noise and disturbances enable the core to operate in harsh environments.

Advanced Verification

To ensure a fully reliable and robust product the core was developed using an advanced verification environment that includes a Random-Generation engine, Code-Coverage and assertion tools.

All 1553 protocol, functions and performance requirements were verified.

3rd Party Validation

All IP Cores successfully passed the full MIL-STD-1553B Notice 2 RT Validation test, according to a test plan from MIL-HDBK-1553A.

Validation tests were performed by an independent 3rd party laboratory.

Simple Integration

In order to simplify the integration of the core, a sample VHDL design that uses the core is provided, including:

- A comprehensive user's manual.
- A VHDL gate level model of the core for the target technology.
- A Transceiver VHDL model that connects the core with 2 buses.
- A bus tester VHDL model that generates 1553 messages and checks the return replies.
- A top Test bench that instantiates all of these components to a working example.
- A simulation script for compiling and running the core.

About Sital

Sital Technology provides world-class products and expertise for communication bus applications in the avionics, aerospace and automotive industries. Sital embeds its vast experience and proficiency in its products which include Mil-Std-1553 and other avionics IP cores, components, boards and testers, as well as CAN bus devices and applications. With its highly-experienced staff of experts, the company's Projects Division undertakes design, integration and turn-key engagements on behalf of the world's leading commercial and military avionics companies, space agencies, and automobile designers and manufacturers. Sital's bus technologies and expertise improve robustness and efficiency as they lower cost, space and resource utilization.

Sital's formidable customer list includes leading military and commercial organizations throughout the world among them: NASA, Boeing, Lockheed-Martin, Honeywell, Raytheon, General Motors, British Aerospace, Thales, ECIL(India), Aselsan, Elbit, Rafael and IAI.

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