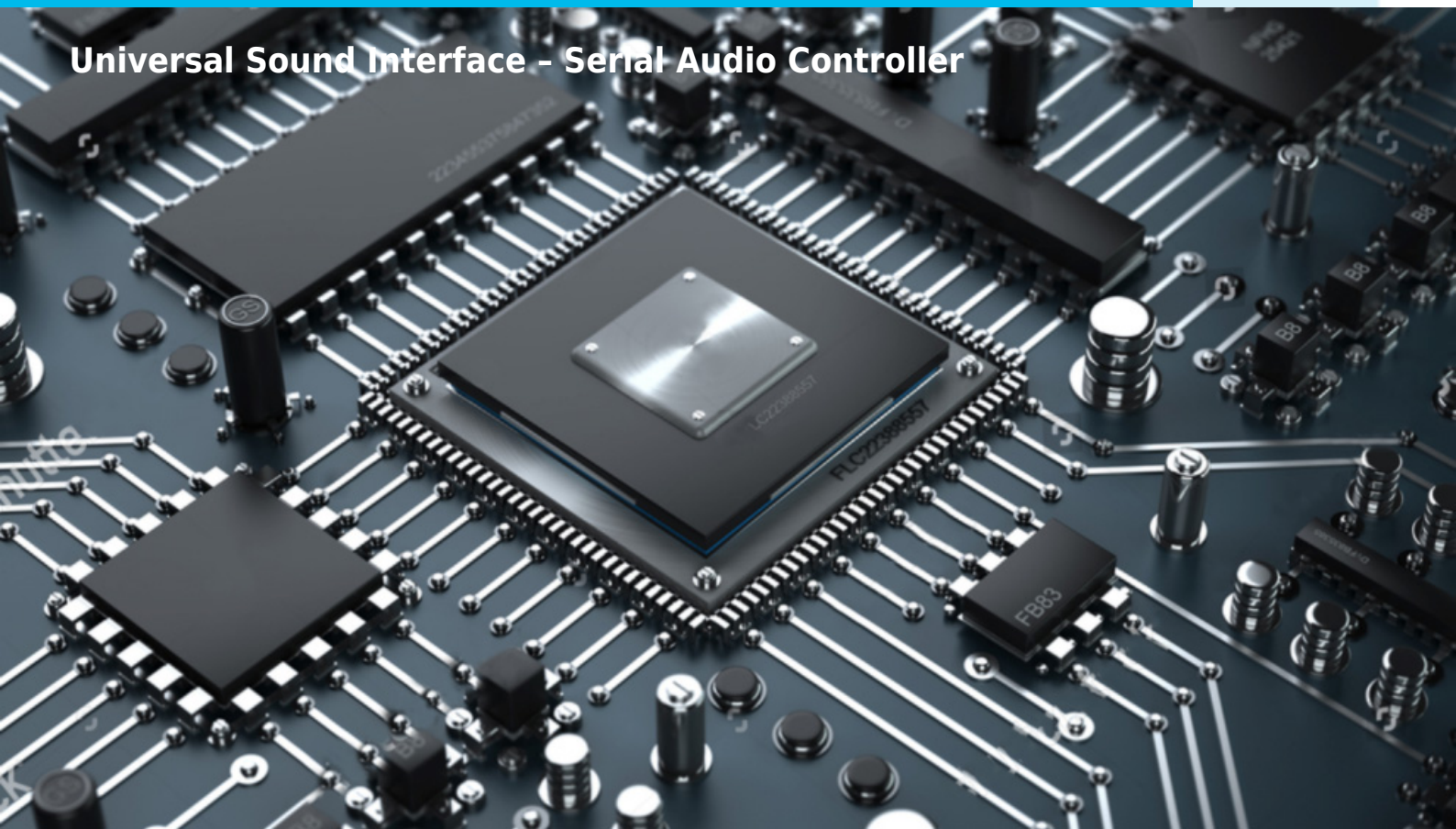


DI2S



Universal Sound Interface - Serial Audio Controller



COMPANY OVERVIEW

Digital Core Design is a leading IP Core provider and a System-on-Chip design house. The company was founded in 1999 and since the very beginning has been focused on IP Core architecture improvements. Our innovative, silicon proven solutions have been employed by over 300 customers and with more than 500 hundred licenses sold to companies like Intel, Siemens, Philips, General Electric, Sony and Toyota. Based on more than 70 different architectures, starting from serial interfaces to advanced microcontrollers and SoCs, we are designing solutions tailored to your needs.

IP CORE OVERVIEW

DI2S bridge to APB, AHB, and AXI bus, it is a **universal solution** that provides an interface between a microprocessor and **I²S, left/right justified modes, PCM, and TDM audio protocol codec**. Thanks to the **flexible configuration** it can work as a **receiver**, or **transmitter in master or slave mode**, with **configurable channel length** or **sample size**. Additionally, a number of audio blocks can be adjusted according to specific project needs.

DESIGN FEATURES:

ALL DCD'S IP CORES ARE TECHNOLOGY INDEPENDENT WHICH MEANS THAT THEY ARE 100% COMPATIBLE WITH ALL FPGA & ASIC VENDORS E.G.

- **Altera / Intel,**
- **Xilinx / AMD,**
- **Lattice,**
- **Microsemi / Microchip,**
and others.
- **TSMC**
- **UMC**
- **SK Hynix**
and others.

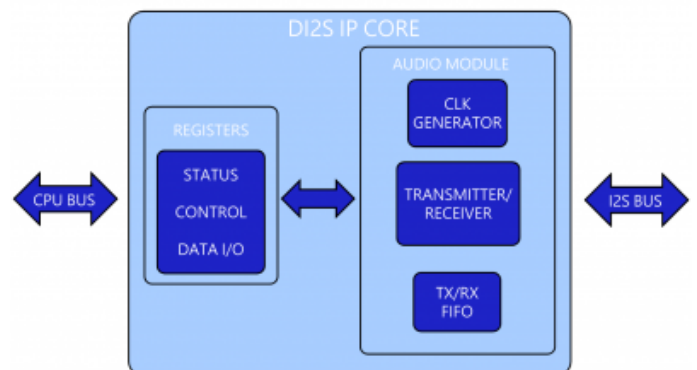
KEY FEATURES

- Configurable number of independent audio modules with their respective FIFO
- Configurable TX/RX mode of each audio module
- Configurable master/slave mode support of each audio module
- Flexible I2S, LSB/MSB (right/left) justified, DSP, TDM modes support
- Configurable sample size (8, 10, 16, 20, 24, 32 bit)
- Configurable number of samples per frame (1 to 16)
- Configurable FIFO depth
- Flexible FIFO threshold interrupt control
- FIFO Underrun/overflow interrupt
- Inter modules clock synchronization
- **Available system interface wrappers:**
 - **AMBA - APB / AHB / AXI Bus**
 - **Altera Avalon Bus**
 - **Xilinx OPB Bus**

DELIVERABLES

- Source code:
 - VERILOG Source Code
 - VERILOG test bench environment
 - Active-HDL automatic simulation macros
 - ModelSim automatic simulation macros
 - Tests with reference responses
 - Technical documentation
 - Installation notes
 - HDL core specification
 - Datasheet
 - Synthesis scripts
 - Example application
- Netlist
 - Netlist for selected FPGA family
 - Sample FPGA project
 - Technical documentation
 - HDL core specification
 - Datasheet
- Technical support
 - IP Core implementation
 - 12 months maintenance
 - Delivery of the IP Core and documentation updates
 - Phone & email support
 - Design consulting

BLOCK DIAGRAM



PERFORMANCE

In this section DI2S implementation results on **Xilinx Zynq-7000 FPGA®** are presented :

Configuration type	LUT	Registers
Single audio block	361	188
Double audio block	698	376
Triple audio block	1080	564
Quad audio block	1453	752

Note that all results assume the most flexible audio block configuration and clocks synchronization, in many dedicated applications those results could be significantly reduced.

LICENSING

Comprehensible and clearly defined licensing methods without royalty-per-chip fees make use of our IP Cores easy and simple.

- **Single-Site license option** - dedicated to small and middle sized companies which run their business at one place.

- **Multi-Site license option** - dedicated to corporate customers which operate at several locations. The licensed product can be used at selected company branches.

In all cases the number of IP Core instantiations within a project and the number of manufactured chips are unlimited. There are no restrictions regarding the time of use.

There are two formats of the delivered IP Core that you can choose from:

- VHDL or Verilog RTL synthesizable source code (called HDL Source code)

- FPGA EDIF/NGO/NGD/QXP/VQM (called Netlist)

HDL Source code is suitable for ASIC and FPGA projects. The Netlist license is intended for FPGA projects only.

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