General Description

The DB-I2C-S-SCL-CLK is an I²C Slave Controller IP Core focused on low power, low noise ASIC / ASSP designs requiring the configuration & control of registers and memory with no free running clock. The DB-I2C-S-SCL-CLK processes the I²C protocol & physical layers, and receives & transmits bytes with respect to the I²C payload to/from User Registers within an ASIC / ASSP / FPGA device. The DB-I2C-S-SCL-CLK Controller implements the Slave-Transmit and Slave-Receive protocol according to the Philips I²C-Bus Specification, Version 2.1 as well as the updated NXP Rev 7 – 1 Oct 2021 Specification.

The DB-I2C-S-SCL-CLK is a member of Digital Blocks DB-I2C Controller IP Core family, which includes I²C Master/Slave, I²C Master-only, and I²C Slave-only configurations.

Figure 1 depicts the system view of the DB-I2C-S-SCL-CLK Controller IP Core embedded within an ASIC, ASSP or FPGA device. The DB-I2C-S-SCL-CLK Controller receives and transmits data with respect to an external I2C Master Controller. The DB-I2C-S-SCL-CLK internally interfaces to User Registers.
Features

- I2C Slave Controller - Implements Slave-only protocol for smaller VLSI footprint, for applications requiring Slave–Receiver and Slave–Transmitter capability
- SCL Clock only for low power, low noise applications requiring configuration & management of User Registers and Memory
- 7- or 10-bit addressing, General Call, SCL Low Wait States
- Supports five I^2C bus speeds:
  - Standard mode (100 Kb/s)
  - Fast mode (400 Kb/s)
  - Fast mode plus (1 Mbit/s)
  - Ultra fast mode (5 Mbit/s)
  - Hs-mode (3.4 Mbit/s)
- Compliance with I2C specifications:
  - NXP Rev 7 – 1 Oct 2021
- Fully-synchronous, synthesizable Verilog RTL core. Easy integration into FPGA or ASIC design flows.

Pin Description

The DB-I2C-S-SCL-CLK I2C Slave Controller interface signals are listed in Table 1. Note that a bi-directional driver is available for SDAI / SDAO.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>I2C Bus Interface</strong></td>
</tr>
<tr>
<td>SDAI</td>
<td>Input</td>
<td>Serial Data</td>
</tr>
<tr>
<td>SDAO</td>
<td>Output</td>
<td>Serial Data</td>
</tr>
<tr>
<td>SCLI</td>
<td>Input</td>
<td>Serial Clock Line</td>
</tr>
</tbody>
</table>

|         |        | **User Register Interface** |
| Please contact Digital Blocks for more information |

Table 1: DB-I2C-S-SCL-CLK – I/O Pin Description
Verification Method

The DB-I2C-S-SCL-CLK Controller IP Core contains a test suite that generates & sends I2C transactions, monitors the I2C bus protocol, and checks expected results.

The DB-I2C-S-SCL-CLK Controller IP Core has internally been verified as follows:
- Instantiated within an FPGA and communicating with NXP I2C Master IP Controller.
- Instantiated within an FPGA, and communicating with Digital Blocks I2C Master IP Controller, and a NIOS II processor for expected data checking.
- Customer Implementations

Customer Evaluation

Digital Blocks offers a variety of methods for prospective customers to evaluate the DB-I2C-S-SCL-CLK. Please contact Digital Blocks for additional information.

Deliverables

The DB-I2C-S-SCL-CLK is available in synthesizable RTL Verilog or a technology-specific netlist for FPGAs, along with Synopsys Design Constraints, a simulation test bench with expected results, datasheet, and user manual.

Ordering Information

Please contact Digital Blocks for additional technical, pricing, evaluation, and support information.

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